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Peace

THE Peace Treaty was signed on Saturday—one of the most momentous documents in the world's history. Nominally, we return to the conditions that prevailed in that fateful July of 1914. But only nominally. The world is a changed world in many aspects. Ancient dynasties have tottered and disappeared for good; international relations—diplomatic, commercial, and financial—have been, for a time, broken up; constructive industry has been diverted to destructive warfare, with the knowledge all the time that the destruction that was proceeding would have later to be made good; life and money have been spent with a recklessness never before known, and the people of nearly every nation have passed through periods of unprecedented agony. At last it is over, and the world has now the heavy task of carrying immense burdens of debt, and reconstructing what has been broken up. Once more, as a race, we have "muddled through," though "muddle" is in this instance not the word to apply to the miracle of effort and organisation which the British people have accomplished. Upon us fell the main burden of the war, and upon us will fall the main burden

of peace. Heavy as that burden must be, there is room for ample confidence if only the qualities which won the war—effort, organisation, and hearty co-operation among all interests—are applied as loyally to the problems of peace.

The position in which Germany finds herself at the end of her mad but gigantic struggle for world domination is the one she deserves. It is thought in some quarters that the terms of Peace are excessively severe. The answer is that they are mild compared with the suffering inflicted on Belgium, Serbia, and France, and with the terms which would have been ruthlessly imposed on ourselves. We say this in no vindictive spirit, but it would be folly to be blind to the facts. Before the war the nations formed a certain partnership in finance, commerce, and civilisation, and that partnership was criminally undermined. When half-a-dozen business men join in a concern, and five of them discover that the sixth has been systematically plotting their ruin, and only save themselves from ruin by a desperate united effort, we may be sure of one thing—they do not take the disloyal partner back again. Nor can Germany expect to be taken back on the old terms—at least for some considerable period. In time the old relations may possibly be restored. How long or how short that may be depends on Germany herself—on her disposition or indisposition to recover her lost soul. For the present our concern is not with Germany, but with those who, like ourselves, have suffered—to make good the colossal losses of the last five years. In the chemical industry especially it will be our duty, as well as our safety, to see that we depend for the future on our own resources, which will be ample if they are only adequately explored and developed.

America and Chemical Independence

In discussing in our first issue the problems which confront the British chemical manufacturer, we pointed out that, apart from the rôle which a reconstituted Germany may be able to play, we have every reason to follow up the efforts of our friendly competitors, the Americans. That America means business there can be no question, and, although for the moment her interest is chiefly absorbed in an endeavour to become, as a nation, chemically independent, it demands no very great effort of imagination to see that once having satisfied her own requirements she will begin to turn her attention to the needs of the eastern hemisphere. Perhaps, the most suggestive illustration of her intentions is the assistance which is being afforded by the United States Government, for no one in this country can fail to be impressed with the report which has been issued by the American Bureau of Foreign and Domestic Commerce. This is nothing more or less than a comprehensive census of every chemical substance which was imported during the fiscal year 1913-14. In other words, the chemical manufacturers

have had put before them a list of those essential substances for the supply of which they were dependent upon outside sources, and—although it does not say it in so many words—the report implies that it is now up to the manufacturers to profit by their war experiences, and to render the country entirely independent of such imports.

In spite of the strides made during the past five years we have still a good many lessons to learn from our cousins across the Atlantic in the way of thoroughness, and the report in question is an admirable example of the ability to get to the bottom of a problem by a concentrated attack upon it. For instance, the compilation represents the energy of a staff of twenty-four persons, extending over a period of ten months, and reviews the records of no fewer than 110 ports of entry. A study of the items shows that of the total imports the greatest proportion was received from this country (23 per cent. of the total), with Germany a good second (19 per cent.). The chief products imported from Great Britain were sulphate and chloride of ammonia, glycerine, bleaching powder, sodium chloride, and sodium cyanide. Our total exports of chemical substances to the United States at this period, in fact, represented a monetary value of approximately £10,000,000 per annum.

This, it must be remembered, is how matters stood five years ago, and before any accurate indication of the extent to which American production has developed during the war period can be obtained it will be necessary to wait for the quinquennial census of manufactures which—covering the five years up to June 30, 1919—should shortly be available. No doubt, the war enthusiasm and energy of the American producers will have told its tale, but it is not to the past but to the coming quinquennium that we must look for some indication of the sincerity of our own determination to obtain a more generous share of chemical requirements the world over. Perhaps, we cannot do better than apply to ourselves some remarks which appear in an American contemporary, namely—if we are sincere in our intentions we must undertake to manufacture those products formerly imported, and to do it in as great variety and quantity as possible. We should select not only those items which are plainly profitable, but those also which, though financially unremunerative for the moment, are economically important, and by so doing we shall mix some patriotism with our brains and enterprise.

Power Alcohol

The Report of the Inter-Departmental Committee on the production and utilisation of alcohol for power and production purposes, which was issued this week, is of such importance that we have printed it in full. The rapid increase in the consumption of petrol during the last decade, together with the position of the world's oil supplies and their distribution, have now made power alcohol a matter of national and international importance, while the difficulties attending the rational solution of the problem have been increased by the shipping situation. At the present time almost every conceivable obstacle is presented to the use and distribution even of properly de-natured alcohol, such as methylated spirit. Thus, it is illegal to purchase more

than four gallons of methylated spirit at a time, transportation in tank wagons and tank steamers is prohibited, and storage is only permitted in bonded warehouses. It is largely due to the pioneer work of one of the members of the Committee, Dr. W. R. Ormandy, that the subject has been considered at all. Dr. Ormandy's evidence before the Departmental Committee on Industrial Alcohol in 1904 was largely responsible for the decisions then made, and his lectures and articles between 1904 and 1907, in which he demonstrated that mixtures of alcohol and benzol are practically equal to petrol for motor car work, may be considered classical. In 1913 Dr. Ormandy read a paper before the Institution of Automobile Engineers in which his earlier researches were confirmed by actual trials.

The article on "Synthetic Alcohol," by Dr. E. K. Rideal, published in our first issue, will, we hope, be a forerunner of further technical communications on this and allied subjects, such as the manufacture of various synthetic products derived from acetylene. The work done on synthetic alcohol has necessarily been heavily censored during the war, even communications to learned societies having had to submit to deferred publication. We hope that this "Progress Report" will be followed up by others at frequent intervals, and that the authorities will at last recognise that the production of power alcohol should be fostered and encouraged in every possible way.

Oil Problems

At the meetings of the leading oil companies reported in this issue, several points of great interest were raised. Sir Marcus Samuel, the chairman of "Shell" Transport, referred to the decreasing production of coal, and the coincident increase in the demand for liquid fuel, the world's production of which is at present estimated at about 40,000,000 tons. Among the suggestions he made was one that if petroleum, instead of being used as fuel, which he described as the most wasteful form, were largely used for internal combustion engines, it would be an economy of great importance in these times of fuel scarcity. Pointing with pardonable pride to the success of the Atlantic flight, he predicted that when the elaborate tests and experiments the company were now carrying out were completed, it would be possible to give to aviators 15 to 20 per cent. more mileage than with any known petrol. It is a big claim, but the Company has done so many big things that it may be possible.

At the Burmah Oil meeting Mr. Cargill (who may be congratulated, by the way, on completing fifteen successful years in the chair) emphasised a point to which increasing attention is being given, namely, the need of liberal provision for research work, especially in connection with oils. Defending the Company's grant towards the endowment of the Cambridge Chemical School, he pointed out that the handling of petroleum is becoming a more and more complex business, and that most valuable products have been discovered in certain oils, entirely as a result of pure research work carried on in academic centres. Enormous sums, he reminded the shareholders, are being spent in America upon research work into chemical problems, and these are being largely contributed by the great industrial enterprises. It is obviously of the utmost importance to this

Company, whose profits are dependent upon a product of which at least 75 per cent. of the world's supplies are produced in America, that the study of the intricate chemical problems on which the progress of the oil industry is dependent should be pursued with at least equal efficiency, as it is only natural that the benefit of the results obtained abroad would first be derived by foreign competitors. It is to be hoped that these liberal, and at the same time practical, ideas will commend themselves more and more to leaders of British industry.

The Fallacy of Nationalisation

It is satisfactory to find so many influential leaders of British industry speaking out emphatically against the policy of nationalising industry. The latest expression of opinion comes from the Association of British Chambers of Commerce, which, at its quarterly meeting on Wednesday, passed a resolution against the State ownership and management of coal mines, and protested against railway, cable, and telephone congestion, and the flooding of home markets with foreign productions. On paper, nationalisation, like academic socialism, looks delightfully easy and equitable. No one is to have unfair preference, everybody will automatically come into his rights, and universal equality and contentment will prevail throughout the State. In practice it comes to something very different. Shorn of the incentive which is present in private enterprise, national business would pass into the hands of an army of paid officials, who would retain, at least, the incentive of keeping a comfortable job, and in matters where foreign interests compete with us, we should be hopelessly handicapped. We have experienced, during the war, some of the joys of State management, and the experience is not encouraging. The Government has a duty to industry in seeing it is granted the best possible facilities, and nobody objects to reasonable regulations in the interests of the nation and of the workers; but to transfer the initiative and control in British industry from the most capable commercial minds in the world to a staff of permanent officials is to invite disaster. The future position of British industry is critical enough already, without embarking hastily on huge experimental changes of this character, and it is desirable that responsible commercial opinion should be brought effectively to bear.

Rayleigh and Brunner

Two very prominent figures in the scientific and industrial life of the nation have passed away this week in the persons of Lord Rayleigh and Sir John Brunner. Lord Rayleigh began brilliantly at Cambridge, and the promise, which Senior Wranglers so often disappoint, was in his case fully realised. If he did not reach quite the highest rank he was acknowledged as one of our foremost physicists, and the discovery of argon, due to him, will ensure the perpetuation of his name. Sir John Brunner was one of the greatest figures in the chemical trade of this country. He passed from a humble position as a youth to one of great influence, and his success was due to keen business capacity and application, and in a particular degree to the application of chemical science to industry. In spite of the great claims which his business made upon his time and energies, he never

neglected humanitarian interests and lived the life of a full citizen. Education was one of the interests which specially appealed to him, and his regard for the rights and comforts of the great community his company employ must be accounted one of the factors in his success and to his credit.

The London Meeting

The views of Dr. Stephen Miall, the hon. secretary and treasurer of the London section of the Society of Chemical Industry, on the forthcoming annual meeting in London, are reported on another page, and will, no doubt, be read with interest. This year the removal of the meeting from South Kensington to the heart of the City emphasises the appeal which the Society makes to the business man. It has been no easy task to convince the manufacturer of the advantage of bringing into his works the best available chemical knowledge and experience, and the support which business houses are giving to this year's meeting is some evidence at least that the Society's work is coming to be appreciated. Of special interest this year will be the conferences of the Inter-Allied Chemical Federation, an organisation yet in its infancy, but by which it is hoped presently to link up the chemical interests of the allied nations in a way that has not hitherto been possible. Wisely, we think, the movement begins from the personal side. When the leading chemists of the five allied nations at present represented by the Federation get to know and understand one another, it should be possible to arrange for co-operative work of a really valuable kind. The arrangements for the annual meeting, we are glad to hear, are proceeding smoothly, and there is every prospect of a series of excellent conferences.

British Scientific Products

The British Scientific Products Exhibition, which was opened at the Central Hall, Westminster, on Thursday, and will remain open until August 5, is a development of the first exhibition held at King's College last summer, and the more recent exhibition at the College of Technology, Manchester. The sections of the present exhibition include chemistry (inorganic and organic products, plant, laboratory ware and apparatus), engineering (prime movers, traction, mechanical devices and models), fuels (solid, liquid and gaseous), metallurgy (ferrous and non-ferrous products, furnaces and plant), and textiles (new productions of scientific interest). We are not able at the moment to offer an opinion on the character of this year's exhibition, but admittedly the previous exhibitions (as was only natural in the circumstances) could not be regarded as at all representative of British resources. The idea of such an exhibition is excellent; all that remains is to make it a really worthy representation of our scientific productions.

Capital and Labour

Proposals for the promotion of more harmonious co-operation between capital and labour are contained in the final report of the joint committee of employers and employed appointed at a conference, under the presidency of Lord Balfour of Burleigh, convened by the North London Manufacturers' Association. The report, which contains much interesting matter, may be had for one shilling from the Secretary, 18, Finsbury Square, E.C. 2.

Costing Systems in Sulphuric Acid Works

By H. J. BUSH, M.Sc., Ph.D., M.I.M.M.

Mr. Bush has experience of acid and metallurgical plants at home and abroad, and will be remembered in connection with recent developments of the Cottrell system for electro-static deposition of dust and fumes. Particulars are given of a costing system which came under Mr. Bush's notice when visiting a large German works, and which should be useful in connection with the reconstruction problems of the sulphuric acid trade.

"We further recommend that the very complete data as to cost of production in acid manufacture and other chemical processes obtained by the Department of Explosives Supply during the war should be given as wide circulation as possible throughout the chemical trades, with a view to encouraging a more general adoption of a more systematic study of manufacturing costs."

This is not the least important among the summarised recommendations of the Departmental Committee appointed to consider and report on the position of the sulphuric acid and fertiliser trades as affected by the new acid plants which have been erected during the war by the Ministry of Munitions. It may, therefore, be of interest to give an account of the method of costing pursued as long ago as 1905 at one of the large chemical works in South Germany producing sulphuric acid (chamber process), oleum of various strengths, chlorosulphonic acid, nitric acid, hydrochloric acid, caustic soda (Leblanc), aluminium hydrate and sulphate, sodium sulphide and thiosulphate, animal charcoal and bleaching powder.

The technical and commercial management in joint consultation would annually estimate the quantities of each product required for the following year, the manufacturing records of the preceding year being the basis for estimating the cost of production. The cost of all raw materials per 100 kg. was meticulously ascertained to one-tenth of a pfennig, as the following examples show:—

1. Coal.

Price c.i.f.	M. 1.400
Freight to works	0.080
Crane charges	0.050
Dock dues	0.006
Unloading and trimming	0.010
	<hr/>
	M. 1.546

2. French Bauxite.

Price f.o.r. works	M. 3.006
Shunting to private siding	0.015
Unloading and trimming	0.012

Cost per 100 kg. M. 3.033

3. Pyrites.

Price c.i.f. Rotterdam	M. 1.200
Freight, insurance, &c.	0.325
Carriage to works	0.080
Crane charges	0.052
Dock dues	0.006
Unloading and trimming	0.023

M. 1.686

Add charges on cinders 0.006

Cost per 100 kg. M. 1.692

The charges on 100 kg. of cinders were made up as follows:—

Loading into trucks	M. 0.015
Cartage	0.093
Dock dues	0.006
Freight to destination	0.085
Insurance, &c.	0.010

M. 0.209

Allowance to acid works 0.200

Net charges per 100 kg. M. 0.009

As 100 kg. pyrites gave 71½ kg. cinders, the charge per 100 kg. pyrites was M. 0.006.

In estimating the costs of production fair average figures based on the working of previous years were taken for labour, steam (electric power was not available), coal consumption, repairs and maintenance, and yields. To these charges were added amortisation at 5 per cent. per annum and general expenses. The steam consumption for each product was worked out in terms of coal, plus labour and repairs. Thus steam equivalent to 100 kg. coal cost:—

100 kg. coal at M. 1.55	M. 1.55
Labour	0.21
Repairs	0.32

Total M. 2.08

The total annual steam consumption, expressed in terms of coal, was 15,801 tons, at M. 2.08 per 100 kg. Incidentally it may here be mentioned that the works stood in the books at M. 1,541,801 odd, of which 5 per cent. (i.e., M. 77,090) were to be charged against production as amortisation. The general expenses amounted in 1904 to M. 213,111.

The following are some examples of the estimated costs of production:—

Sulphuric Acid of 78 per cent. strength.

Estimated production for the year, 12,960 tons.

To make 119.7 kg. of sulphuric acid of 78 per cent. strength, equivalent to 100 kg. of 93½ per cent. strength, there are required:—

70 kg. pyrites at M. 1.70	M. 1.19
1 kg. nitric acid at M. 20.30	0.20
Steam	0.24
Labour	0.24
Repairs and maintenance	0.23

M. 2.10

Amortisation 0.10

General expenses 0.30

Cost of 119.7 kg. of 78 per cent. acid M. 2.50

Sulphuric Acid of 93½ per cent. strength

(concentrated in iron stills).

Estimated production for the year 1905=4,300 tons.

119.7 kg. sulphuric acid 78 per cent. ...	M. 2.50
25 kg. coal at M. 1.55 ...	0.34
0.12 kg. sulphate of ammonia at	
M. 25.00 ...	0.03
Royalty ...	0.05
Steam ...	0.03
Labour ...	0.10
Repairs and maintenance ...	0.15

M. 3.20

Amortisation ...	0.10
General expenses ...	0.30

Cost of 100 kg. of 93½ per cent. acid M. 3.60

20 per cent. Oleum.

Estimated production for the year=13,770 tons.

55 kg. pyrites at M. 1.70 ...	M. 0.94
45 kg. sulphuric acid at M. 2.50 ...	1.13
10 kg. coal at M. 1.55 ...	0.16
Platinum loss ...	0.03
Steam ...	0.09
Labour ...	0.31
Repairs and maintenance ...	0.34

M. 3.00

Amortisation ...	0.10
General expenses ...	0.30

Cost per 100 kg. 20 per cent. oleum M. 3.40

Nitric Acid.

Estimated production (calculated as acid of 52.9 per cent. strength)=8,000 tons.

80 kg. nitrate of soda at M. 20.50 ...	M. 16.40
86 kg. sulphuric acid at M. 2.50 ...	2.15
25 kg. coal at M. 1.55 ...	0.39
Steam ...	0.38
Labour ...	0.65
Repairs and maintenance ...	0.94

M. 20.91

Credit for 100 kg. of nitre cake ...	0.87
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M. 20.04

Amortisation ...	0.40
General expenses ...	1.10

Cost per 100 kg. of 52.9 per cent.

nitric acid ... M. 21.54

There was a chemist in charge of each of the following departments:—(1) Caustic soda, sulphate of soda, hydrochloric acid, thiosulphate, bleaching powder; (2) oleum (roughly twelve units); (3) nitric acid; (4) sulphuric acid, aluminium sulphate, sodium sulphide.

Monthly charge sheets were supplied to each chemist, with the following entries thereon:—

Stocks of raw materials at beginning of month.

Stocks of raw materials at end of month.

Stocks of finished products at beginning of month.

Stocks of finished products at end of month.

Quantities of finished products delivered to stores.

Quantities of finished products delivered to other departments.

On another part of the sheet there were two additional columns, one for the "bogey" showing the amounts of raw materials, labour, steam, coal, repairs and maintenance per 100 kg. of finished product to which the department was entitled according to the estimates of cost referred to above, and the other showing the amounts actually consumed and chargeable for that particular month. Any saving on the "bogey" cost was credited to the department concerned, and taken into consideration when the year's work was reviewed and the bonus distributed. To facilitate the check on the consumption of raw materials the latter were stacked in separate heaps on their arrival at the works, and each heap had to be worked up before starting a new one. The monthly stocktaking was done by the chemist in charge, assisted by the foreman, and the returns were checked by half-yearly stocktakings, superintended by a responsible official of the costing department. In this way any errors in the monthly statements of stock could be rectified in the half-yearly returns.

These counterchecks were rigorously applied, and sometimes gave unexpected results, but their effect on the whole was a wholesome one. On one occasion the oleum department had to submit to an unlooked-for charge of M. 30,000 for platinum which had been carried as being in stock on the asbestos contact elements, until one day a new official refused to sign the return of this item until the platinum contents of a number of these elements had been determined analytically. It was found that instead of 27 grammes each cloth contained only 8 grammes of platinum. Incidentally, this unfortunate discovery proved a blessing in disguise, as subsequent returns showed that the conversion was just as good with the lesser quantity as with what had up till then been regarded as the minimum for good working.

The monthly returns had to be handed in at the general manager's office not later than the third day of each month. This rule was strictly enforced, and, in fact, constituted one of the chief advantages of the system. With the sheets in front of him the manager could see at a glance in which department unusual charges had been incurred and inquire into the reason for them. Defects in operation could immediately be located, and steps taken to avoid them in the following month without having to wait for six months or longer before the trouble was discovered. Another good point of this method was that the operating chemist became familiar with the prices of the raw materials entering into the costs of his finished products, and would very quickly make it his business to ascertain the cause of any variation in such charges; in short, his interest in costing being stimulated, he viewed his day's work more from the owner's standpoint than that merely of a superior foreman-in-charge.

The monthly sheets were supplemented by log-books, in which daily entries were made of the materials consumed and of the movements of half-finished and finished products, thus enabling the man in charge to visualise the state of his production at any time.

While these notes do not pretend to represent modern practice, they show that many years ago our competitors were fully alive to the advantages of a system of detailed costing, the absence of which, prior to the war, in many British acid works was deplored in the Government report referred to above. It is to be hoped that the subject of costing will be thoroughly ventilated in the technical Press, and that in this way and by interchange of information owners of even moderate-sized works will be led to adopt a uniform and comprehensive system for the control of costs.

The Chemical Trade Joint Industrial Council, consisting of representatives of employers and workpeople, has instituted a commission to inquire into the causes of unrest amongst shiftmen in the chemical trade, and to submit recommendations as to remedies.

The Society of Chemical Industry

Dr. Stephen Miall's Views on the Forthcoming Annual Meeting in London

EVERYWHERE throughout the chemical industry the annual meeting of the Society, to be held in London on Tuesday to Friday, July 15—18, is being looked forward to with keen interest. It comes almost immediately after the signing of the Peace Treaty, when the leaders of industry are turning their thoughts to the restoration and expansion of British trade, and this fact, together with the attendance of so many distinguished delegates from allied nations, gives the conferences of this year a special importance. Our readers will, therefore, be interested to have some general impressions and further particulars, which Dr. Stephen Miall, the honorary secretary and treasurer of the London Section of the Society was good enough to give us in the course of an interview this week. Dr. Miall needs but little introduction to members of the chemical industry. A son of the well-known Professor Miall, F.R.S., he has inherited his father's scientific tastes, and has combined with them an uncommon degree and quality of business capacity. About eighteen months ago he succeeded Mr. T. D. Morson in the dual office of honorary secretary and treasurer of the London Section, which may consider itself fortunate in having secured one who so happily combines the necessary organising genius with the hardly less necessary qualities of tact and courtesy. The arrangements for the London meeting have thrown much work and responsibility on Dr. Miall, and his reward already lies in the smoothness with which they are going forward and the promise of complete success some fortnight hence.

"The Society," said Dr. Miall, in discussing the arrangements and prospects of the annual meeting, "was founded in 1881, so this will be our 38th annual meeting. It promises to be rather larger than usual; approximately there will be about 400 delegates at the conferences, but at some of the social functions no doubt the attendance will be considerably larger. The conferences, although, of course, intended primarily for the members of the Society, are open, and we shall welcome anyone who is interested in the questions under discussion.

The Inter-Allied Movement

"The meeting this year is of particular importance on account of the foreign delegates who are coming over from France, Belgium, Italy, and the United States. This interesting development arose in this way. Last autumn Mons. Paul Kestner came over to deliver an address at one of the meetings of our Society, and we took advantage of his presence to discuss whether some co-operation between French and English chemists was not practicable. The result was that he invited the Society to send over six delegates to Paris last April. Invitations at the same time were given to representatives from Italy, Belgium, and the United States. A number of interviews and discussions took place, and there the foundations were laid of a federation of chemists from the five allied countries, and it is hoped in due course that the federation will include representatives of other countries. The council consists of two members from each country, and its duty is to draw up a constitution and consider what can usefully be done. This council was invited by the Society of Chemical Industry to hold its first meeting in London on the occasion of the Society's annual general meeting, and that accounts for the presence this year of such an unusual number of distinguished foreigners. They cannot for a time do more than draw up rules and a constitution and discuss preliminaries, but it is intended that the allied federation shall eventually not only co-operate among themselves on all matters of pure and applied chemistry, but shall undertake in the respective countries the publication of all

important chemical literature, the abstracts of literature published abroad, and do a considerable mass of work which before the war was done—and, as I think, well done—by Germany, but which for the future we intend to do for ourselves.

The Position of Germany

"Is it intended," Dr. Miall was asked, "to limit the federation to these five allied nations?"

"By no means," he said. "The present position is simply this. It is easier to promote co-operation between five countries than between ten or more, and until we have got the thing going in a proper orderly manner the work will be confined to those countries. Later it may be possible to invite the late neutral nations to join us, but any question of further co-operation will have to be deferred until we see how the world is going to carry on under the new régime which we hope is beginning. It will be a rather difficult matter to co-ordinate the work between nations who speak different languages, who have different traditions and different ways of regarding problems, and in some respects different problems to face. We must begin by getting to know each other personally and understanding each other. The progress during the first few months cannot be rapid; we shall begin quietly, explore the ground gradually, and find out what is possible."

"And the position of Germany?" we asked.

"Personally, I have no desire at all to shirk that point," said Dr. Miall. "At the moment you cannot expect a Frenchman, whether a chemist or whatever other occupation he may follow, to put his legs under the same piece of mahogany with a German, and discuss problems of science and industry in a friendly way. When over in Paris I visited some of the districts of France devastated by the Germans, and I realised, perhaps not as fully as Frenchmen but better than many of our own countrymen who have not been over there, that it is impossible for people who have undergone such treatment—and that for the second time—to obliterate their feelings. One cannot expect Frenchmen to co-operate with Germans in their present state of mind. So the question of the inclusion of Germany could hardly at this stage arise."

Chemical Research in Works

Turning again to the arrangements for the meetings, Dr. Miall spoke warmly of the support and sympathy found on every side. "The chemical trade of London and the neighbourhood," he said, "is contributing very handsomely towards defraying the expenses of the meeting, and this has enabled us to get on comfortably with the arrangements. The appreciation of our work which so many chemical firms are exhibiting may, I think, be taken as evidence that the Society has done some really useful work in the interests of the trade as a whole. Most of the founders of the Society, men like Dr. Levenstein, Dr. Ludwig Mond, and others, are now dead. They were wise in their generation, and saw how much chemistry could help the industries of the country. I only hope the younger generation will not forget to follow in their footsteps."

"The fact is," Dr. Miall continued, "there was never a time when research in chemistry and the application of chemistry in manufactures was of so much importance to this country as now. The present is, perhaps, the greatest opportunity which has ever occurred in our history of putting the trades which depend on chemistry on a thoroughly sound basis. In spite of all the good work which has been done, much more still remains to be done. It is fortunate that the

purely scientific men in chemistry are associating themselves more and more with the manufacturers, to the great advantage of both. One of the most notable instances of this was the action of the oil trade in contributing £210,000 towards the endowment of a chemical school at Cambridge. The advantage of linking up chemical science with chemical industry is beginning to be felt, but not yet quite adequately. The manufacturers, although improving, do not appear to me yet fully to realise the necessity of getting the most highly trained men. Too many of them adhere still to the old-fashioned principle of getting a cheap scientific adviser, instead of a really good one. That seems to me very poor economy. If they pay a man only £3 a week they usually get a man worth £3 a week, whereas if they paid £500 a year they might get a man who might save them much larger sums than that, and possibly introduce new processes of permanent value to industry."

"There is one further point," Dr. Miall added, "which might be worth mentioning. We are holding the meeting this year in the city of London instead of at South Kensington, because this year we want to make our existence and our work more especially known in the City, which, of course, is the business world. We wish to extend our acquaintance with the business community rather than with the purely educational or academic community. We have been fortunate in receiving the very kind hospitality of several of the Livery Companies, who have lent us their halls. This, I need hardly say, is a kindness we very much appreciate and value. Among the bodies who have lent us their halls are the Goldsmiths' Company, the Salters' Company, the Clothworkers' Company, and the Girdlers' Company. To the foreign delegates especially these beautiful old halls, historically associated with the development of English industries, will be places of great interest, and our conferences will gain by the kindness of the various companies in placing them at our disposal."

Principal Speakers and Subjects

Turning to the subjects selected for discussion, Dr. Miall remarked that they were all more or less important in their bearing on British trade. Take the subject of "Empire Sugar Production," for example. "A committee was appointed in 1917," he explained, "to consider the possibilities of the Empire in regard to its complete sugar supply, with a view to future developments. This committee will present its report at the meeting on July 16. The report, which is a long one, will comprise data obtained from the United Kingdom and from practically the whole of the British Empire. It appears that the possibilities of the extended production of sugar within the Empire are enormous, and there seems to be no reason why the Empire as a whole, if its own resources are properly developed, should go on importing sugar from elsewhere. The speakers at this conference are expected to include Major Courthope, Sir Richard Garton, Sir Daniel Hall, Dr. E. J. Russell, and Sir G. Sutherland, and it is hoped that the Earl of Denbigh, who has taken a great interest in beet sugar, will take the chair."

"As far as the conference on 'Power Plant in Chemical Works' is concerned, I think your readers are already aware that it has been arranged by the Chemical Engineering Group of the Society, a group only recently formed by a number of very energetic members of the Society. Papers will be read on 'The Up-grading of Brown Coals and Lignites,' by Professor W. A. Bone, F.R.S.; on 'Powdered Fuel Equipment,' by Captain Goodwin; on 'Modern Gas Producer Practice,' by Mr. A. H. Lynn; on 'The Production of Steam from Low-grade Fuel,' by Mr. P. Parrish; on 'Electrical Supply in a Chemical Works,' by Mr. H. Martin; on 'Differential Pressure Meters,' by Mr. J. L. Hodgson; on 'Surface Combustion Boilers,' by Mr. P. Kirke; on 'Hydro-

electric Power,' by Mr. R. P. Tod; and on 'Chemical Works Power Plant,' by Professor J. W. Hinchley.

"At the conference on 'Dye Stuffs,' &c., it is hoped that Lord Moulton will take the chair, and papers will be read on 'Progress in the Dyestuff Industry,' by Dr. H. Levinstein, Professor G. T. Morgan, F.R.S., and Mr. E. V. Evans; on 'The Manufacture of certain Nitro-compounds,' by Mr. B. Hickson; on 'Synthetic Drugs,' by Mr. F. H. Carr; and on 'The Organised Preparation of Laboratory Chemicals,' by Dr. M. O. Forster, F.R.S.

"At the conference on 'The Chrome Tanning Industry' there are papers to be read on 'The Chrome Tanning Industry in the United States,' by Professor McCandlish; on 'Chrome Tanning in Great Britain,' by Mr. M. C. Lamb; and on 'The War Services of the Chrome Tanning Industry,' by Dr. Gordon Parker.

"The conference on 'The Fermentation Industries' will include papers on 'The Manufacture of Acetone,' by Colonel Sir Frederick Nathan; on 'The Acetone Fermentation Process,' by Mr. Amos Gill; and on 'The Employment of Micro-organisms in the Service of Chemical Industry,' by Mr. A. Chaston Chapman. It is expected that Professor Fehrbach, of Paris, will contribute to the discussions.

"These are the principal features of our conferences this year, and in addition we shall have a number of distinguished guests at our social functions. These include Sir Herbert Morgan, the Master of the Salters' Company, Mr. R. G. Perry (chairman of the Association of British Chemical Manufacturers), Professor H. E. Armstrong, Sir Arthur Churchman, Bart. (the late mineral oil controller), Professor Moureu (president of the Inter-Allied Chemical Council), Sir Thomas Rose, Sir Cameron Gull, Sir Richard Glazebrook, Right Hon. Sir Alfred Mond, Bart. (Chief Commissioner of Works), the Hon. R. C. Parsons, Sir J. J. Dobbie (chief Government chemist), Sir R. Gregory, Sir William Pope, and many others.

"Altogether," said Dr. Miall, "we have reason to expect a very successful meeting, and an attendance thoroughly representative of chemical science and chemical industry."

Provisional Programme of Arrangements

By the kindness of the Court of the Worshipful Company of Salters, the office and headquarters of the Section during the meeting will be at the Salters' Company Hall, St. Swithin's Lane, E.C. 4. The office will be open from Monday, July 14th, to Friday, July 18th, inclusive, between 10 a.m. and 6 p.m. Previous to Monday, July 14th, all communications to be addressed to Dr. Miall, Society of Chemical Industry, Central House, 47, Finsbury Square, London E.C. 2. Telephone number: London Wall 2429.

MONDAY, JULY 14TH.

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|-----------|----|----|--|
| 10 a.m. | .. | .. | Meeting of Inter-Allied Federal Council at Salters' Hall, St. Swithin's Lane, E.C. |
| 1 p.m. | .. | .. | Luncheon at the Girdlers' Hall, 39, Basinghall Street, E.C. |
| 3 p.m. | .. | .. | Meeting of Inter-Allied Federal Council at Salters' Hall, St. Swithin's Lane, E.C. |
| 7.30 p.m. | .. | .. | Dinner given by the Catalysts, Charing Cross Hotel, W.C. |

TUESDAY, JULY 15TH.

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|--------------|----|----|---|-------------------------|--|
| 10 a.m. | .. | .. | Council Meeting. | } At the Mansion House. | |
| 11 a.m. | .. | .. | Annual General Meeting | | |
| 1 p.m. | .. | .. | Welcome by the Rt. Hon. The Lord Mayor of London. Address by the President, Professor Henry Louis, D.Sc. | | |
| 1 p.m. | .. | .. | Luncheon at the Connaught Rooms, Great Queen Street, Kingsway, by invitation of the London Section. | | |
| 3.30 p.m. | .. | .. | Conference. At the Mansion House. Inter-Allied Chemical Federation. Addresses by Representatives of the Inter-Allied Conference, to be opened by Sir William J. Pope, F.R.S., Chairman of the Federal Council for Pure and Applied Chemistry. | | |
| 8.30—11 p.m. | .. | .. | Soirée and Reception at the Imperial College of Science and Technology, South Kensington. | | |

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WEDNESDAY, JULY 16TH.

- 10 a.m. .. Meeting of Inter-Allied Federal Council at
Salters' Hall, St. Swithin's Lane, E.C.
- 1 p.m. .. Luncheon at the Girdlers' Hall, 39, Basinghall
Street, E.C.
- 3 p.m. .. Meeting of Inter-Allied Federal Council at
Salters' Hall.

WEDNESDAY, JULY 16TH—Continued.

- 10.30 a.m.—1 p.m. { Conference at Salters' Hall, St. Swithin's Lane,
and E.C.
3 p.m.—5 p.m. { *Power Plant in Chemical Works.*
10.30 a.m.—1 p.m. { Conference at Clothworkers' Hall, Mincing Lane,
and E.C.
3 p.m.—5 p.m. { *Empire Sugar Production.*
7.15 for 7.30 p.m. .. Annual Dinner at the Savoy Hotel, Strand, W.C.

THURSDAY, JULY 17TH.

- 10 a.m. .. Meeting of Inter-Allied Federal Council at
Salters' Hall, St. Swithin's Lane.
- 3 p.m. .. Meeting of Inter-Allied Federal Council at
Salters' Hall.
- 10.30 a.m.—1 p.m. { Conference at Salters' Hall, St. Swithin's Lane,
and E.C.
3 p.m.—5 p.m. { *Dyestuffs, Synthetic Drugs and Associated
Products.*
- 10.30 a.m.—1 p.m. Conference at Goldsmiths' Hall, Foster Lane,
E.C.
The Chrome Tanning Industry.
- 3 p.m.—5 p.m. .. Conference at Goldsmiths' Hall, Foster Lane,
E.C.
*Recent Developments in the Fermentation
Industries.*
- 8.30 p.m.—11 p.m. Reception at British Scientific Products Exhibi-
tion, Central Hall, Westminster.

FRIDAY, JULY 18TH.

Excursion to Windsor and Taplow.
Leave Paddington Station (Great Western
Railway) for Windsor. Lunch Windsor.
By steam launch to Cookham Lock and
Taplow. Tea, Cookham. Return Taplow
to Paddington.

"English" Inventors

To the Editor of THE CHEMICAL AGE.

SIR,—In the interview published in the first issue of THE CHEMICAL AGE, Professor Henry Louis points out that the war was made possible to Germany by (*inter alia*) the discovery by an "Englishman" "how to make basic steel from phosphoric iron ores." I understood that this Englishman was a Welshman of the name of Thomas, a clerk in the police court at East Ham, who, whilst attending a lecture on metallurgy at a technical college in the Mile End Road, happened to take to heart a casual remark by the lecturer that anyone who could eliminate phosphorus from iron would confer a benefit on civilisation! He went home to his native country and started experimenting at Neath, finding sand a basic agent for dissociating the phosphorus from the iron, and his turning from acids to bases was entirely a matter of his own divination.

This benefactor, although he unconsciously assisted Germany by enabling her to utilise her low grade ores, deserves some credit, although (I believe) posthumous, for a discovery of such momentous value. As one interested in industrial chemistry I should be glad to learn the history of this great discovery.

Professor Louis, I am sure, does not wish to grudge to Scotland the credit of discovering the illuminating and heating qualities of gas from coal by describing William Murdoch as another Englishman. Was he not born and educated in Scotland?—Yours,

JAMES MORTIMER.

German and Alsatian Potash

To the Editor of THE CHEMICAL AGE.

SIR,—I have read with interest your article from a French correspondent and your editorial note on the question of Alsatian potash.

When Alsatian and German potash salts are discussed it is usually assumed that, as regards quality, the two products are interchangeable. The German cartels were, naturally, disinclined to enlighten their foreign customers on the respective merits of Strassfurth and Alsace fertilisers; they did their best even to conceal the fact that the latter article existed, and where this could not be done successfully, they adduced figures intended to prove that the deposits of the ex-"Reichsland" were of inconsiderable value in relation to the output of German potash. While, in 1917, German agriculture consumed in all 750,000 tons of pure K₂O, Alsace was only allowed to furnish 35,000 tons, which figure would, under normal conditions, hardly be called a talking point for the capabilities of the Alsatian mines. But as in politics Germany often contradicted herself, so in economics; on the one hand, she belittled the resources of Alsace and Lorraine when she wished to advertise her own before 1914, and on the other hand, in order to soften English and American hearts, she said in pre-armistice times that the loss of the Alsatian potash mines would cripple her, because her own output barely sufficed to cover her internal requirements; she claimed that this circumstance alone, quite apart from the feared loss of Lorraine iron, should entitle her to keep Alsace. Germany had to bow to the inevitable, and her loss is, fortunately, France's gain.

How serious the loss is will be perceived when it is pointed out that German kainite only averages 12.4 per cent. pure K₂O, and that she has to refine all salts of a higher average. Alsatian kainite averages, at its lowest, 14 per cent. pure K₂O, and reaches, as a rule, 15 to 16 per cent. Moreover, there is a higher grade kainite (sylvinitic riche) which, in its natural state, averages 20 to 22 per cent. This difference in quality is a factor which Germany finds it difficult to explain away.

As to wages, Germany will have no advantage over the French workers. The mark may continue to have a smaller purchasing power and enable the German mines to take advantage of it in framing their prices for export, but the German workman also knows of the depreciation of his currency, and encouraged by the Spartacists, keeps on asking for higher pay. In fact, these demands have already made themselves felt to such an extent that the nationalisation of the German potash mines has not only been hinted at, but seriously discussed as perhaps the only likely means to save the industry from collapse. One material effect of the workers' demands for more wages has been the advance in the price of potash, which was decided upon at the recent congress, when the outlook of the German potash industry was on the agenda.

Instead of conforming to this upward tendency, the Alsatian mines have left their prices unchanged, and both Allied and neutral consumers have been enabled to buy in the cheapest market, an opportunity which they never enjoyed in pre-war times. At that period, Germany regulated the prices, at certain intervals, heedless of the laws of supply and demand. The temptation to follow the recent German lead and advance quotations was great, for considering that no supplies are coming or likely to come from Germany in the immediate future, and that Alsace is, at this moment, the only source from which natural potash can be drawn in exportable quantities, it would have been easy to enforce a higher level, but the economic statesmanship which looks ahead and does not try to exploit a monopoly will be appreciated everywhere. English farmers especially will doubtless rejoice that an absolutely essential fertiliser has been placed within their reach at comparatively moderate figures, and leaving aside all sentimentality, they cannot fail to feel satisfied that they are at last freed from German shackles.—Yours, etc.,

A FRENCH READER.

July 1, 1919.

[The determination of relative values is, of course, outside our province, but we publish this letter because it is a sincere expression of French, and especially Alsatian, feeling and because we think it desirable that the French point of view should be known in this country.—EDITOR C.A.]

Sulphuric Acid Plant

A Hint to the Prospective Erector

IN our last issue we published an extract from the report (published some few weeks ago) of the Departmental Committee which dealt with the question of the respective merits of the various methods of producing sulphuric acid. Before the war nearly the whole of the sulphuric acid in this country was produced by the old chamber process or one of its modern modifications. As with many other things, however, the demand for acid increased enormously, and its essentiality for the production of innumerable war products demanded the prompt erection of a number of new plants. Time was, perhaps, the factor of chief importance, and in many instances the cumbersome chamber plant gave way to the contact and other systems.

The result is that, though the experience may have been bought dearly, it has been the means of providing us with a highly valuable comparison between the economy of the various systems and their adaptability to the particular local conditions met with. In all, it may be said that for the majority of the more ordinary purposes the chamber system has come through with a very good account of itself, and there is still a good deal of room for doubt as to whether in the long run it is not the most suitable, except in such cases where special requirements arise. For instance, where acid of high strength is required there can be no question that the contact system provides the most effective solution; but—apart from explosives which cannot be classed among regular trade activities—only a comparatively small quantity of this acid is needed for purposes such as the manufacture of dyes. During normal times of peace by far the largest quantity of sulphuric acid is turned to account in the production of fertilizers such as sulphate of ammonia and superphosphates, and as the 80 per cent. variety is most commonly employed for the purpose, the chamber plant has no comparative drawbacks in respect to strength.

More important still, however, is the consideration that the modern processes usually involve an army of testers and highly experienced overseers, whereas the chamber plant, building up the product, so to speak, from first principles, is frequently supervised by an ordinary workman. This general practice is not to be encouraged. In fact, it is believed that the ultra rule-of-thumb methods adopted before the war have probably by now received their quietus, and the economy of technical supervision and scientific thought is appreciated. Moreover, the studies made in relation to the oxidation of ammonia on the Ostwald principle have, by the introduction of the ammonia converter, rendered the chamber process free from the necessity for employing imported nitrate. At the moment there is undoubtedly a surfeit of sulphuric acid plant in the country, and the question of the erection of new plant is scarcely likely, therefore, to arise for some time. When it does, however, it will pay the prospective erector to study the report referred to before coming to a decision as to the type of plant to select.

A. M.

Excess Profits Duty and Chemical Industries

(By A BARRISTER-AT-LAW.)

THE excess profits duty case reported in the first issue of THE CHEMICAL AGE (p. 16) calls attention to the service which such a periodical can supply to scattered experts and traders by co-ordinating them into a common group, catering for their needs and defining their rights and duties. A trade paper gives a lead to combination of individuals for mutual protection and individual progress. Had the Marine Steam Turbine Company, Ltd., been a person, with no means, they

would have been unable to fight the Crown and to submit to Mr. Justice Rowlatt that the receiving of royalties is not a "trade" or "business," at least, within Section 38 of the Finance (No. 2) Act, 1915. A poor inventor would have had to submit to the imposition, when, with the advice of a trade journal and the associated brotherhood of common interest which such a periodical engenders, the legal rights of the individual could have been watched and conserved against the misinterpretations of a too zealous surveyor of taxes and the sophistries of a sanguine counsel.

The case is instructive not only to dukes drawing royalties on the extraction of minerals from the bowels of the earth for the purposes of industrial chemistry and chemical engineering, but also to those benefactors of society, unknown to fame, who have been able to scrape £5 together to patent their new discoveries in chemical processes and products before putting them on the market for exploitation by men of business qualifications and enterprise.

The reduction of excess profits duty from 80 per cent. to 40 per cent. this year will remove an incubus from development in chemical ventures—of all ventures the last to be strangled in their present nascent struggle for self-assertion.

Germany's Post-War Trade

Explosives, Dyes, and Metals

SOME valuable information concerning the industrial position in the occupied territory of Germany was given by Mr. H. B. Fergusson at the conclusion of the quarterly meeting of the Association of British Chambers of Commerce on Wednesday.

Mr. Fergusson, who has been Chief Technical Adviser to the British Military Governor of Cologne, and practically controlled all the large German factories in the occupied districts, said that Germany to no small extent, depended upon the combining of her capital and the pooling of her knowledge in the various industries for the success, which she had met in certain of those industries. In the chemical industry, particularly, they had very wisely pooled all their knowledge so that all their factories worked with the maximum of efficiency.

They had what they called an *Interessengemeinschaft* in their various trades, and these bodies, though they did not interfere with the executive organization of the various factories and companies, did regulate the prices at which articles were sold, the prices which they were willing to pay for raw materials, and did give to one another their trade secrets.

In the manufacture of explosives the Germans were much behind this country. On the whole, he thought that the metal works were behind. In textiles, of course, they could not touch us. So really we had very little to fear, except that in the handling of their raw materials they certainly used every labour-saving device to cut out the employment of labour as much as possible. In their power stations they were very efficient. Coal was taken from the mines without handling, to certain stations where powerful engines—50,000 kilo turbines—generated power at two pfennigs per horse power, which was equivalent to about a farthing per horse power.

They distributed power electrically and not mechanically, consequently industries consuming large quantities of power, such as electro-chemical products, electro-furnace products, aluminium, and so on, were carried on at less cost than was the case in this country, and at present we could not compete in those industries.

As to future trade with Germany, he said that he had met many Commissions and heads of large industries in this country, in Cologne. They all wanted to sell something to Germany. They all wanted their own particular industry to be protected, but no one seemed to realise how Germany was going to pay for the goods. There was no doubt that Germany wanted such goods, but they did not know themselves how they were going to pay for them. We had got to realise somehow or other that we must use the workmanship of German people to pay for what we had to sell to them. They had no raw material whatever; only a little potash, and in that industry the French wished to promote their fields in Alsace and Lorraine. In dyes we had bound them up hand and foot, and they could hardly move, and in regard to coal they had no more than they could use for themselves.

Two Leaders of Science and Industry

The Late Lord Rayleigh and Sir John Brunner

ALMOST within a few hours of each other, and nearly at the same age, this country lost this week by death two of the most notable figures in British science and industry—Lord Rayleigh, the great physicist, known among many other distinguished things, as the discoverer of argon, and Sir John Brunner, the head of the great chemical concern of Brunner, Mond & Co. Lord Rayleigh died on Monday night at his home in Essex, at the age of 77 years; Sir John Brunner died on Tuesday morning at Silverlands, Chertsey, also at the age of 77.

Lord Rayleigh.

Lord Rayleigh was one of a little band of eminent British physicists who took up the work begun in the eighteenth century by Robert Boyle. Joseph Priestley, Davy, Faraday, Joule, Clerk-Maxwell, and Kelvin were among the most notable of them. He entered Trinity College, Cambridge, from private study, and at the early age of 20 took his degree in the Mathematical Tripos with first place—that is, Senior Wrangler. This rare success was noted at the time by our leading journals as a fact of great promise, which his later career fully realised. He obtained also the equally coveted distinction of first Smith's Prizeman—a distinction all the more remarkable in that year because the second was gained by Alfred Marshall. A year later he was elected to a Fellowship at Trinity, but had to vacate it in 1871, when he married Miss Evelyn Balfour, sister of Mr. Arthur Balfour. In 1879, when the Chair of Experimental Physics at Cambridge became vacant by the premature death of Clerk-Maxwell, he was generally regarded as the most suitable man to follow him, and was duly elected to the position, which carried with it the directorship of the Cavendish Laboratory. Under Maxwell the laboratory had become a recognised research centre but had not been developed as a place for the instruction of students. Lord Rayleigh devoted his energies successfully to the organisation of a system of practical teaching in experimental physics; the measure of his success was indicated in the increased popularity of the Natural Science Tripos which in 1884, the year in which he resigned, attracted more than three times as many candidates as in the year when he was appointed.

In 1884 he served as President of the British Association at Montreal, when, for the first time, it met outside the British Isles, and soon after his return from Canada he was elected one of the secretaries of the Royal Society, a position he held until 1896. In 1887 he became Professor of Natural Philosophy at the Royal Institution, in succession to Tyndall, and held this position until 1905, when he received the highest honour open to a British man of science, the Presidency of the Royal Society. Three years later the University of Cambridge also bestowed on him the highest honour by electing him her Chancellor in place of the late Duke of Devonshire.

Lord Rayleigh's first scientific paper appeared in 1869, and in the following year he published an important memoir on the theory of resonance. In 1871 his reputation was made by a series of papers on optical questions, including the theory of the scattering of light by small particles and its application to explain the blue colour of the sky, anomalous dispersion,

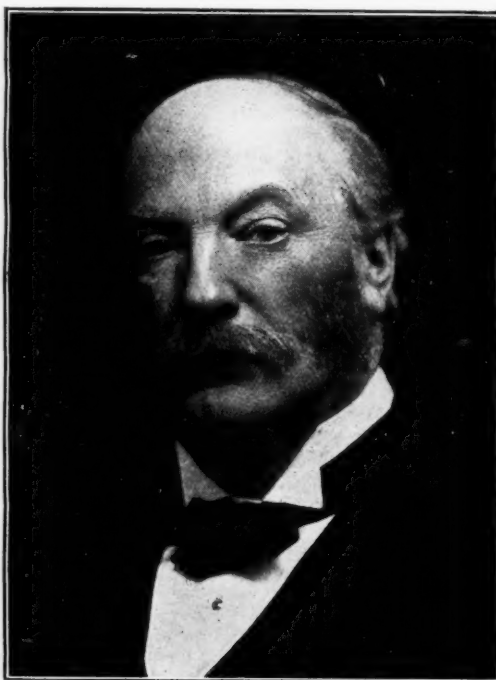
the nature of white light, and reflection from crystals. In 1872 he discussed the copying of diffraction gratings by photography, and in 1877-78 he published the first edition of his classical treatise on the theory of sound. The five years he spent at the Cavendish Laboratory were extraordinarily fruitful, and during that period he continued a series of papers on "Acoustical Observations" which he had begun in 1877, published a number of observations in optics, with special reference to the spectroscope and the resolving power of optical instruments, and inquired into the conditions governing the instability of water-jets.

Further, in spite of the demands made on his energy by administrative routine, he found time to carry out, aided by his sister-in-law, Mrs. Henry Sidgwick, most laborious and exact determinations of fundamental quantities in electric measurement—the value of the ohm, the electromotive force of the Clark standard cell, in the construction of which he introduced great improvements, the electro-chemical equivalent of silver, and the specific resistance of mercury. His results formed the basis on which the legal definitions of the electrical standards of electromotive force, current and resistance, were subsequently established by a Board of Trade Committee, of which he was a leading member.

The Discovery of Argon

In 1888 Lord Rayleigh opened a fresh investigation for the redetermination of the physical properties of gases, including, of course, their specific gravities. When he came to nitrogen, the gas that forms, roughly, four-fifths of our atmosphere, he found marked divergencies in the results according as he procured it by removing all other known constituents from the air (oxygen, carbonic acid, and water-vapour) or from the decomposition of nitrogen compounds such as ammonia, this "chemical nitrogen" being the lighter. His scientific erudition recalled a similar discrepancy noted and roughly measured a century before by Cavendish, though the record was masked in the difficult and obsolete

terminology of the "phlogiston" theory. He soon found that though chemistry had been his first love, as he stated in his presidential address to the British Association at Montreal in 1884, the difficulties of the task demanded the collaboration of an expert in this science, and he invited the assistance of Sir William (then Professor) Ramsay. In 1894 the sensational result of this collaboration was announced to the British Association at Oxford (though the full paper was only presented to the Royal Society a year later). The atmosphere was found to contain an unexpected constituent to the amount of 1 per cent.—a gas which differed from pure nitrogen in its greater density (20 : 14), its spectrum, and especially in its absolute inertness, for then, as ever since, it steadily refused to enter into any chemical combination. On this ground they named it "Argon" (Greek "workless"). From the rate of transmission of sound it was inferred that its molecule contained but a single atom, instead of two, like most elementary gases, and Sir William Ramsay subsequently discovered in it minute quantities of three other equally inert new gases—neon, krypton, and xenon—which, with helium, constitute a group of elements distinguished by their properties, or rather by their absence of properties, from every other kind of matter known to the chemist.



Elliott & Fry.

THE LATE LORD RAYLEIGH.

Although Lord Rayleigh would generally be placed a degree below Faraday, Kelvin, Clerk-Maxwell, and his own pupil, Joseph Thomson, he was undoubtedly one of the first British mathematical physicists of his generation. In many cases his services to science consisted in giving the final polish to theories already established in their main outlines, in searching out and frequently removing difficulties which had escaped the notice of previous investigators, and in pointing to *lacunæ*, the filling up of which often showed the way to further extensions of knowledge. He combined a comprehensive grasp of fundamental principles with high mathematical powers and consummate experimental skill. The part he took in settling the standards of electrical measurement has already been alluded to. He was chairman of the Treasury Committee which recommended the establishment of the National Physical Laboratory, and after that institution had been founded he contributed to its success by presiding over its Executive Committee. He acted as Chief Gas Examiner under the Metropolitan Gas Acts, and he sat on the Board of Trade Committee which reported on the methods of testing gas.

Sir John Brunner

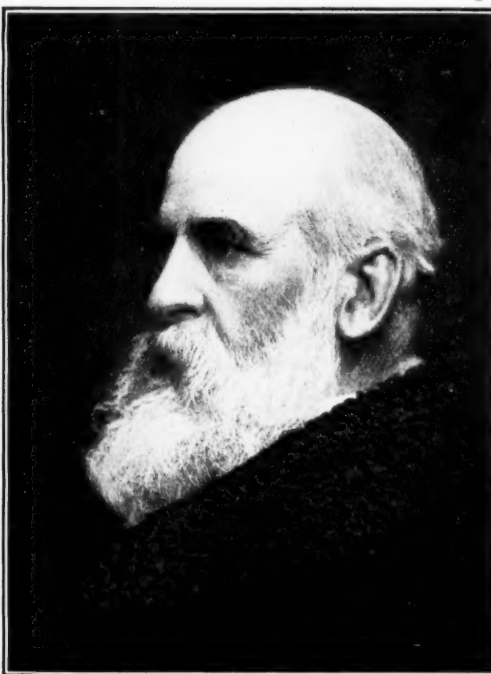
It is unnecessary in any community interested in industrial chemistry to point out the important place which Sir John Brunner occupied as the head of the great firm of Brunner, Mond & Co. He began life at a humble level; he ended it one of our greatest industrial princes. His success was due to great keenness, ability and application, but his devotion to business never hardened a kindly nature, and he retained his human interests to the end.

Born in Liverpool, where his father, a Zurich pastor, had established a private school, he was educated entirely at his father's school, that boasted among its students many of the most famous names in the development of Liverpool—Rathbone, Holt, Muspratt, and others. He began his commercial career in an office in Liverpool, and afterwards went to Widnes, now a famous chemical centre. He used to say that he had made it a habit, when he was a very poor man, married on a young clerk's salary, to travel regularly first-class, with the result that he mixed with the leaders of business and learnt their views and ideas. The turning point of his fortunes came when he met Dr. Ludwig Mond. At the age of 20 he became works manager to Messrs. Hutchinson & Earle, the chemical manufacturers, at Widnes. About the same time the firm took into its employ a young chemist—the late Dr. Mond. The two young men became friends, and in 1873 they joined forces, bought the Winnington Hall Estate, near Northwich, in the Cheshire salt region, and began to make alkali under the Solvay system. Their capital was small, and their struggles at first were severe; but the era of difficulty only lasted a year or so, and the works of Brunner, Mond & Co. around Northwich—at Winnington, Lostock Gralam, Sandbach and Middlewich—are now among the largest of their kind in the world. Sir John Brunner remained chairman of his company to the end. Mr. J. F. L. Brunner, who represented the Northwich Division of Cheshire from 1910 till last December, succeeds his father in the baronetcy. He is married to a daughter of the late Mr. O. Vaughan Morgan, M.P., and has one son and a daughter. The new baronet and his brother, Mr. Roscoe Brunner, are both active in their father's business. The third brother was drowned on the Continent many years ago. Mr. Roscoe Brunner presided over the recent meeting of Brunner, Mond & Co., and his able review of the enormous business of the company showed how fully he had inherited his father's business capacity.

Large and onerous as the business interests were which Sir John Brunner commanded, he found considerable time for political and social work. He inherited his father's interest in education, and at a time when educationists were discussing the problems of continuation schools and technical instruction, he introduced into the Northwich works a system of apprenticeship that to some extent solved the problem, and has been adopted since in other places. Under this system, apprenticeship was conditional upon attendance at evening classes held within the works, and, upon the attainment thereof of a high degree of efficiency. Sir John also made several liberal donations for the cause of education. He gave £10,000 to University College, Liverpool, now the University of Liverpool (of which he had been Pro-Vice-Chancellor); he founded a library at Northwich; and at Runcorn and Winsford he set up guild halls for trade unions and friendly societies.

Sir John entered Parliament as a Liberal for Northwich in 1885, and sat for that constituency until 1909, with only a short break between 1886 and 1887. He was created a baronet in 1895, and a Privy Councillor in 1906. He served on several commissions, including the one on canals, and was the author of a book "The Eight Hours Question."

Perhaps the most remarkable of the qualities that made Sir John Brunner so good a citizen and so powerful an influence was the extraordinary freshness of mind that he preserved throughout his career. Many men who have achieved great success in business, or in any other sphere in which organisation is of paramount importance, tend to become more conservative with advancing age. Sir John Brunner remained to the end a young man, with the ardour and enterprise of youth, and a mind that was always learning and assimilating. He was never too tired to welcome some new idea. He never let his lifelong associations become a bondage. And it may be added that in private life he was one of the kindest and most considerate men, and was, perhaps, most esteemed by those who were privileged to know him best.



Elliott & Fry.

THE LATE SIR JOHN BRUNNER.

In connection with the death of Sir John Brunner, (our Manchester correspondent writes) the chemical trade will recall a great trial about 1907, when the Salt Union sought to prevent Messrs. Brunner, Mond & Co. from extracting the Salt Union's brine and mineral. In his work on "Salt in Cheshire," Mr. Albert F. Coldert records the result of that celebrated action. It was decided in the Lord Chief Justices' Court that the Union could not legally prevent Messrs. Brunner, Mond & Co. from doing so. "The Board (of the Salt Union)," he says, "announced their intention of appealing against that decision, but wisher counsels prevailed; and by the annual meeting, in 1908, a settlement had been arranged by which the chemical firm paid the Union £125,000, and received from them the transfer of some 350 acres of land and minerals in Northwich, while both sides paid their own law costs."

In addition to possessing expert knowledge of the properties of acetylene gas, which gained him a European reputation, Mr. J. W. Gatehouse, who lately resigned the appointment of public analyst to the city of Bath, conducted a minute series of investigations into the properties of the constituent gases of the Bath mineral waters some years ago. The gases were examined under reduced pressure, and their distinctive colours revealed by the passage of an electric current. Further investigations were conducted by the aid of the spectroscope.

The Production of Alcohol for Power

Inter-Departmental Committee's Comprehensive Report

THE Report of the Inter-Departmental Committee on various matters concerning the production and utilisation of alcohol for power and traction purposes was issued this week [Cmd. 218], price 2d. net. The Committee consisted of the late Sir Boverton Redwood, Bt. (Chairman) (nominated by the Petroleum Executive); Major A. M. Cooper-Key, C.B. (nominated by the Home Secretary); Mr. A. Philip, Admiralty Chemist (nominated by the Admiralty); Mr. H. F. Carlill, Industrial Power and Transport Department (nominated by the Board of Trade); Professor C. Crowther (nominated by the Board of Agriculture and Fisheries); Dr. J. H. Hinchcliff, Department of Agriculture and Technical Instruction, Ireland (nominated by the Irish Office); Colonel Sir F. L. Nathan, K.B.E. (nominated by the Ministry of Munitions); Mr. H. W. Garrod (nominated by the Ministry of Reconstruction, but altered during the Peace Conference to Mr. Ralph Walter); Sir H. Frank Heath (nominated by the Scientific and Industrial Research Department); Mr. H. Wyatt (nominated by the Imperial Motor Transport Council); Sir F. W. Black; Professor H. B. Dixon, F.R.S.; Brigadier-General Sir H. C. L. Holden, F.R.S.; Dr. W. R. Ormandy; and Mr. E. S. Shrapnell-Smith (Secretary) (nominated by the Petroleum Executive). Sir J. J. Dobbie, F.R.S. (nominated by the Chancellor of the Exchequer), was added later.

The reference was to consider and report on:—(1) The various available sources of supply of alcohol, the methods of manufacture, and the cost of the product; (2) the suitability of alcohol, either alone or in admixture with solid, liquid, or gaseous combustible substances, for use in internal-combustion engines, and the modifications of the existing types of such engines which may be necessary to the attainment of efficiency; (3) the question of denaturing the alcohol, and the alterations to be made in the present excise arrangements. The report is addressed to Mr. W. H. Long, M.P., Minister in charge of the Petroleum Executive.

Text of the Report.

Sir,—The cessation of hostilities shortly after our appointment made it desirable that we should so order the course of our proceedings as to enable us to carry the work as rapidly as might be to the point at which it would become possible to present a progress report covering generally the terms of reference. That point has now been reached, and we accordingly record our conclusions and recommendations, the adoption of which we consider to be necessary if alcohol and mixtures of alcohol, with ether or with hydrocarbons, are to be brought into use for power and traction purposes as fuels alternative to petrol.

2. We decided, for the reasons stated above, to divide the work entrusted to us between two sections, each to report to the Committee on the specified matters remitted to it. One of these sections studied the subject of "production," whilst the other dealt with that of "utilisation."

Colonel Sir Frederic L. Nathan was Chairman of the Production Section, which was asked to report on the following matters: (a) Waste lyes from sulphite wood-pulp factories; (b) wood, including sawdust and other wood-waste; (c) peat; (d) bracken, and other vegetation; (e) the mahua and other trees; (f) potatoes, maize, beet, molasses, and other alimentary substances; (g) seaweeds; (h) synthesis; (i) ferments; (j) denaturants; (k) residuals.

Brigadier-General Sir H. Capel L. Holden was Chairman of the Utilisation Section, which was asked to report on any necessary action under the following sub-headings:—(a) Admixture of alcohol with other fuels in order to permit efficient use in existing internal-combustion engines; (b) devices and fittings, such as special primers and carburettors; (c) adaptation of existing engines by structural alteration; (d) determination of rate of propagation of flame in alcohol and alcohol mixtures, as compared with petrol; (e) comparative bench-tests; (f) designs for and tests

of "all alcohol" engines; (g) determination of effect, if any, of the products of combustion of alcohol upon engine-parts; (h) initiation and supervision of the commercial-scale, experimental use of alcohol under service conditions on the highway; (i) formulation of schemes for the marketing and distribution of alcohol and alcohol mixtures; (j) propaganda directed to educate potential consumers, and to ensure the creation of correlated and complementary interest and support. Preliminary reports from the sections have been received and discussed by us.

3. Apart from our work in sectional meetings and sub-committees, we have held six meetings of the full Committee, and examined ten witnesses, including one witness each from Canada, India, and South Africa. Four of the witnesses spoke from personal experience of the production, adaptation, and successful utilisation of alcohol motor-fuel, as a substitute for petrol, for traction or other power purposes.

We have also addressed certain inquiries to: (a) the Munitions Board of India; (b) the Honorary Advisory Council for Scientific and Industrial Research, Ottawa; (c) the Advisory Council for Science and Industry, Melbourne; (d) the South African Scientific and Technical Committee, Pretoria.

4. We have studied the report and recommendations of the Departmental Committee on "Industrial Alcohol" appointed by the Chancellor of the Exchequer in the year 1904, and we direct attention to the unanimous opinion expressed by that Committee in para. 30 of the report presented to both Houses of Parliament in February, 1905, as follows:—

"Any question, therefore, of the use of spirit for motor vehicles will be one of price, and as at present the price of petrol is about half the price of methylated spirit, we think that close investigation of the matter may be delayed until such time as there may be an approximation between the prices of petrol and spirit sufficient to create a practical alternative of choice between the two."

It is clear to us that conditions fulfilling the anticipations of the Departmental Committee of 1904 are in sight.

5. We have received reports to the effect that some sections of the community believe that the words "industrial alcohol" refer to an inferior spirit for drinking purposes. We recommend, therefore, that all alcohol for power or traction purposes should be described as "power alcohol," and we invite all interested traders to adopt that course, subject to the later detailed provisions which we suggest in para. 13 of our report. This description has already been adopted in Australia.

6. To the enormous growth of road motoring during recent years, especially in the United States of America, there will now be added the requirements of high-grade petrol for aeroplanes and airships, to which no limits can be assigned.* We have also had evidence that the sale price of petrol to the public in America rose 200 per cent. between 1914 and 1918. Whilst it is impossible for us to forecast the development of total petrol consumption for all countries and all purposes, facts are not wanting to indicate the likelihood in the not distant future of so great a pressure of demand as to cause at any rate a very high level of prices, and we are satisfied that close investigation should now proceed with the object of providing alternative supplies of motor-fuels derived from new or supplementary raw materials.

We are satisfied that the time has come for Government action, which should pay due heed to both current and prospective prices for petrol, or other petroleum products, benzol, and alcohol motor-fuel or its admixtures.

* The petrol consumptions and annual increase in the U.S.A. alone have, for all purposes, been as under:—

Year.	Total Consumption. Imp. Gals.	Increase over previous year. Imp. Gals.
1914 ...	1,200,000,000
1915 ...	1,400,000,000 ...	200,000,000
1916 ...	1,680,000,000 ...	280,000,000
1917 ...	2,320,000,000 ...	640,000,000
1918 ...	2,680,000,000 ...	360,000,000

The reduction in rate of increase during the year 1918 was an account of civilian economies to make provision for war requirements. The 1919 increment promises to exceed that for 1917.

Research and Experiments

7. Professor H. B. Dixon has undertaken at our request the direction in an honorary capacity of a scheme of experimental research in the Chemical Laboratories of Manchester University. The completion of this research, the object of which is to provide accurate data concerning the behaviour of alcohol, alcohol-benzol, alcohol-ether, and other alcohol-mixture vapours on their combustion with different volumes of air, and with varying percentages of water and denaturants, is estimated to occupy a further period of at least six months.

The necessary expenditure on apparatus, staff, and sundries for this work was generously met by the Royal Automobile Club and the Commercial Motor Users' Association jointly.

8. We carried through, with the concurrence of Professor Sir John Cadman, Director of H.M. Petroleum Executive, the necessary arrangements with the Lords Commissioners of H.M. Treasury, the Board of Customs and Excise, and the Board of Directors of the London General Omnibus Company, Ltd., for a practical trial over a period of about twenty-six weeks of alcohol-benzol and alcohol-benzol-petrol mixtures in one complete fleet of motor-omnibuses. The company has undertaken to make various incidental bench and other tests for our information, and to place its full records, including comparative results with other fuels, at the disposal of the State. The difference in price between the actual cost under war conditions of the alcohol used for this experiment and the price which the company would have paid for equivalent petrol was borne by the funds of H.M. Petroleum Executive.

The directors of the London General Omnibus Company, Ltd., in acceding to our request to afford facilities for a large-scale trial in London under daily-service conditions, and under our supervision, have afforded us an unequalled opportunity of acquiring for public use records of great importance in their bearing upon future developments, and we desire to take this opportunity of recording our appreciation of their public-spirited action.

This commercial-scale trial is now proceeding.

Future Synthetic Production

9. We have received exhaustive technical evidence from representatives of the Ministry of Munitions concerning the investigations made by them during the war in respect of the extraction of ethylene from coal and coke-oven gases, and concerning quantitative results so obtained. Lord Moulton, in his capacity as Director-General of the Explosives Department of the Ministry, sat with us at one of our meetings when this subject was specially considered in relation to future output, the synthetic conversion of the ethylene into ethyl alcohol, and the estimated costs of the processes involved.

The testimony of witnesses and records of work done indicate that there is thus available in Great Britain a large potential source of power alcohol, but further investigations are necessary in this connection, particularly as regards the conversion of the ethylene into alcohol, before definite figures as to quantities and price can be given.

Vegetable Sources

10. The outstanding and fundamental attraction of alcohol motor-fuel as a substitute for any fuel necessarily derived from coal or oil deposits lies in the fact that, on account of its chief sources being found in the vegetable world, supplies of raw material for its manufacture are being continuously renewed, and are susceptible of great expansion without encroachment upon food supplies.

We are of opinion that steps should be taken to ensure increased production of power alcohol by the extended use of the vegetable matters from which it may be obtained. Important materials of this nature are:—(1) Sugar-containing products, such as molasses, mahua flowers, sugar-beet, and mangolds; (2) starch or inulin-containing products, such as maize and other cereals, potatoes, and artichokes; and (3) cellulose-containing products, such as peat, sulphite wood-pulp lyes, and wood.

We have been unable to obtain comprehensive estimates of the world's production of molasses, although we have been furnished with statistics concerning the total quantities shipped from various countries; but there is evidence that large quantities produced in numerous sugar-growing areas are allowed to run to waste.

We have received interesting evidence from the Director of Commerce and Industries to H.E.H. the Nizam of Hyderabad (Deccan) concerning achieved production costs and yields of power alcohol from the flowers of the mahua tree (*Bassia latifolia*), which flourishes in the Central Provinces as well as in Hyderabad. The witness stated that the sun-dried flowers of this tree contain on the average 60 per cent. by weight of fermentable sugar, that they can be collected and delivered to the factory in the zone of growth at £1 10s. per ton, and that the yield on proper fermentation and distillation is found to be about 90 gallons of alcohol (95 per cent. by volume absolute) per ton. He further stated that the flowers can be pressed, packed, exported, and stored for long periods without deterioration. We also understand that cultivation of the mahua tree has not as yet been attempted, and that there may, therefore, be possibilities of increased production of flowers by cultural treatment.

The large-scale cultivation of maize and other cereals as raw material for the manufacture of power alcohol has admitted possibilities, as to the full extent of which we have been unable to complete our inquiries; but it would appear that prospective production of alcohol from these sources in the overseas Dominions and other parts of the Empire is encouraging both as regards quantities and cost.

Seeing that 1 ton of potatoes yields only 20 gallons of 95 per cent. alcohol, while the yield from artichokes is only very slightly higher, we are of opinion that, having regard even to the pre-war prices of potatoes and artichokes in the United Kingdom, power alcohol cannot be produced in this country from these sources on a commercial basis except under some system of State subvention. Similar considerations apply also to the sugar beet and mangold crops.

No satisfactory method for the utilisation of peat as an economic source of power alcohol has been brought to our notice. We are, however, of opinion that in connection with researches into the use of peat for various purposes its potential value as raw material for the manufacture of such alcohol should not be overlooked.

We are of opinion that, so far as vegetable sources of raw material for the manufacture of power alcohol are concerned, we must rely mainly, if indeed not entirely, on increased production in tropical and sub-tropical countries.

Denaturants and Denaturing

11. We have received a valuable report from the Government Chemist, Sir James J. Dobbie, upon practices usual in all countries to effect the denaturing of alcohol so that it shall be unfit for human consumption and proof against illicit purification to render it potable. It appears to us, however, that as regards the United Kingdom new conditions would arise if the market price of petrol were to remain permanently as high as that of denatured power alcohol, or approximately as high.

The use of alcohol as a fuel for power or traction purposes in the United Kingdom has not been commercially practicable hitherto by reason of the high price compared with that of petrol. Since the denaturing process now in use admittedly increases the cost, sometimes by as much as 6d. per gallon, the increase should be restricted as much as possible by reducing the proportion of the principal denaturant wood-naphtha. In all cases of approved use for power or traction purposes, where the user gives bond, the proportion of wood-naphtha in the power alcohol might be substantially diminished, the difference being made up, wholly or partially, by petrol, benzol, or other nauseous substance, supplemented by a small quantity of methyl violet as colouring, but in our opinion a further deterrent can be provided by the imposition of much heavier penalties than those now sanctioned by law for evasion of the spirits duty in any case of illicit purification of power alcohol to render it potable.

The lowest attainable cost for denaturing power alcohol should be officially recognised as an important consideration, in addition to the necessity of securing a non-potable spirit and protecting the revenue against fraudulent practices.

We recommend that every effort should be made by research and practical trial to provide a denaturant or alternative denaturants—e.g., formaldehyde, pyridine, and tobacco oil—the employment of which will be effective in the smallest possible quantities and at the lowest possible cost per gallon of power alcohol.

We are of opinion that, when denaturing operations are carried out at any transport depot or yard, the existing regulations of the Board of Customs and Excise should be relaxed to permit

the necessary volumetric mixings to be made in any suitable tank or other storage-vessel, notwithstanding the fact that such vessel may still contain power alcohol previously denatured, provided that no re-filling supplies for vehicles are drawn during the operations nor until after the new mixing is completed to the satisfaction of any officer of the Board in attendance.

Facilities for Importation and Distribution

12. Our attention has been directed to the possibility at no distant date of the importation from Canada, India, and South Africa into this country of power alcohol shipped in tank steamers. This proposal is obviously in part dependent upon the provision of adequate storage facilities at the ports of arrival, and it is our opinion that no impediment should be placed in the way of manufacturers or importers who seek to promote such new developments of fuel supply. If power alcohol is denatured to an approved specification before landing in this country, it appears to us to be superfluous to impose the usual bonded warehouse rules and regulations upon those who store and handle it after landing, although we are agreed that special rules will have to be observed.

Other witnesses have pointed out the advantages of the transportation of power alcohol by rail or road in tank-wagons instead of drums, barrels, or other small containers. This proposal is one of more immediate interest. The London motor-omnibus trial has already produced an application for permission to convey power alcohol by road in tank-wagons, although the London General Omnibus Company, Ltd., at the suggestion of the Board of Customs and Excise, did not press the request. We are of opinion that the use of rail or road tank-wagons of the usual construction or of any other type approved by the Board of Customs and Excise, should be allowed for the purpose in question, under seal if the alcohol be undenatured, and that the extension of such methods of conveyance should be facilitated by all concerned.

We recommend that, having regard to the exemption of home-produced benzol and shale motor-spirit from the motor-spirit tax (Excise), power alcohol when produced in the United Kingdom be correspondingly exempted, and that, having regard to the scope for earlier large production in the Empire overseas, importation of power alcohol be permitted free of duty.

13. All sales and deliveries of power alcohol should be made on the basis of a certified percentage by volume of absolute ethyl alcohol, with a minimum of 90 per cent. at a temperature of 62° F.

We are of the opinion that in denatured alcohol, or in admixtures of alcohol, benzol, ether, petrol, or the like, sold as power alcohol, the ratio of water to alcohol after admixture should not exceed one part by volume of water to nine parts by volume of alcohol measured at ordinary temperatures.

We further consider that when benzol, ether, petrol, or the like are mixed with alcohol in quantities in excess of those which may be legally required as partial denaturants, the nature and amounts per cent. by volume of such components should be plainly stated on the containers of such mixtures and on the contracts, sale-notes, and invoices dealing therewith.

Future State Action to Develop Production and Foster Utilisation

14. We have, in a preceding paragraph (No. 10), referred to the basic difference between alcohol on the one hand and benzol, petrol, or other petroleum products on the other—a difference which has not as yet been properly appreciated—i.e., the fact that the chief raw materials for the production of the former can be renewed and are susceptible of great expansion, whilst those from which the latter are derived are limited to deposits, definite in extent, that cannot be renewed. Furthermore, as power alcohol is miscible with water in all proportions, its use affords greater safety from fire than does the employment of benzol, petrol, or other petroleum products. We consider that these two factors should be regarded as sufficient grounds in themselves to justify State action in fostering the production and utilisation of alcohol for power purposes.

The work of the Sections, so far as it has been carried, has been sufficient to show the complex and far-reaching character of the problem, and has convinced us that it can only be handled adequately by concerted Government action.

We think that the development of the alcohol industry cannot be left entirely to the chances of private enterprise, individual research, and the ordinary play of economic forces. No doubt in the long run, after a tedious process of trial and error, alcohol would find its proper place as a power fuel, but only with the maximum of friction, great fluctuations in price, and serious waste of time, money, and energy. The situation needs to be watched continuously, and measures taken from time to time to ensure a smooth and rapid adjustment of supply to demand.

15. We are of opinion that the question of State action to educate the public concerning the merits of power alcohol and mixtures of that fuel, by demonstrating, through the agency of series of lectures and exhibitions, or other appropriate means, the manner in which these alternative fuels can be best applied as sources of power in motor-vehicle and stationary engines, should be seriously considered.

16. It is amply evident that any further investigations concerning the production of power alcohol should include an examination into the necessity for revision of the statutory regulation that the specific gravity of distillers' wort before fermentation must be ascertained by means of the saccharometer.

It is equally essential that the necessity to allow fermentation and distillation to proceed simultaneously in the same building, and to allow continuous distillation, should receive early consideration.

General Recommendations

17. We are of opinion that the time has come for action by the Government to ensure close investigation of the questions of production and utilisation, in all their branches, of alcohol for power and traction purposes.

In the British Empire there are vast existing and prospective sources of alcohol in the vegetable world, although in the United Kingdom itself production from these sources is now and is likely to remain small, but synthetic production in this country in considerable quantities, especially from coal and coke-oven gases, is promising.

As the price of alcohol for power and traction purposes, to which we propose the name of "power alcohol" should be given, must be such as to enable it to compete with petrol, it is essential that all restrictions concerning its manufacture, storage, transport, and distribution should be removed so far as possible, consistent with safeguarding the revenue and preventing improper use, and that cheap denaturing should be facilitated.

We recommend that an organisation should be established by the Government to initiate and supervise experimental and practical development work, at home and overseas, on the production and utilisation of power alcohol, and to report from time to time for public information on all scientific, technical, and economic problems connected therewith. This organisation should be permanent, have at its disposal the funds necessary for its investigations, be in close relation with the various Governments of the Empire, and be so constituted as to be able to deal with alcohol in conjunction with other fuels which are or may become available as a source of power.

18. Finally, we are of opinion that steps to facilitate the production and utilisation of power alcohol in the United Kingdom can in no circumstances be taken, nor arrangements for such development carried into effect, unless provisions and alterations of the kind we recommend in our report are made in advance of the time when an acute recurrence of high prices for motor-fuels may otherwise call for action too late for it to be effective.

19. We cannot conclude our report without expressing our deep regret at the loss of our chairman, who had taken the keenest interest in the whole of the proceedings. His death occurred the day before our meeting to consider the final draft of this report, with the terms of which we have reason to know he was in complete accord.

5, Carlos Place, W. 1, June 23.

We have received from Adam Hilger, Ltd., astronomical and optical instrument makers, of 75A, Camden Road, London, N.W. 1, a set of booklets describing instruments for the measurement of refractive index, absorption, wave-length, and rotatory power, which have been found suitable for use in chemical laboratories; together with an essay on the theoretical principles involved in such measurements.

Burmah Oil

Scientific Problems of the Industry

At the annual meeting of the Company on Thursday, June 26, a final dividend of 25 per cent., making for the year a total distribution of 30 per cent., as against 32½ for 1917. It was explained that the 30 per cent. on the Company's present capital was equal to 45 per cent. on the capital as it stood in 1917.

The World's Oil Industry

In submitting the accounts Mr. John Cargill (chairman) referred to the general position of the oil industry. Last year (he said) I explained at some length the then general conditions of the oil industry all over the world, and the enormous rise that had taken place in the price of all oil products since the outbreak of the war, and in order to meet any possible charges of "profiteering" that might be levelled against the Burmah Oil Company, I made it perfectly clear that the large increase on its profits was to a very large extent due to the world-wide rise in the prices of both light and heavy petrol and paraffin wax and candles, and that in the one direction—the kerosene market in India—in which we could exercise any control over prices we were, in order to protect the poorer native consumer, continuing to supply our "Victoria" quality of kerosene—which, as I then told you, represents fully 50 per cent. of our refined products—at the same very low price we fixed for it when we inaugurated our maximum price policy as far back as 1905. And what I said to you then as to the directions in which our increased profits were mostly being earned and the policy we were carrying out to protect to the best of our ability the consumer in India I can repeat to you to-day, for it is to the further advance in the prices of petrol and wax and candles during the year, and to a temporary favourable modification of the arrangement under which we dispose of our export benzine, together with the refining improvements already referred to, that our increased profits are largely due, and we have continued scrupulously to adhere to our maximum price for "Victoria" kerosene, although we had it in our power any day we pleased to raise this to the parity of the all-world value of kerosene and thereby add enormously to our profits.

In support of this statement I may mention that not only the importers of foreign kerosene into India, but even some of our indigenous competitors, have for a considerable time past now refused in any way to recognise or be bound by our maximum price policy, and to the extent that we have been unable to supply the requirements of India they have exacted their own price, with the result that they have been selling at fully threepence per gallon above our price the same quality of kerosene as ours, and which in the pre-war days they sold at level prices with us. This fact, you will appreciate, has made it extremely difficult—in fact, almost impossible—for us to ensure that our kerosene, of which our output is not sufficient to meet the total requirements of India, reaches the actual consumer at our low maximum price, there, of course, being a great inducement and considerable facilities under the ruling conditions to "profiteering" on the part of the middleman. The Government of India have for some time past been giving this matter their most serious consideration, and as the outcome of consultations between representatives of the Government, ourselves, and our friends the Asiatic Petroleum Company an arrangement for the pooling of our own and the Asiatic's kerosenes has been evolved which should now ensure that the consumer gets the full benefit of our maximum prices, at which we are continuing to put the whole of our kerosene into that pool.

With the termination of the war we are now in a position to go ahead with many important schemes—including the electrification of our principal oilfields—for modernising and improving our methods of working and manufacture, and the carrying out of which will call for very heavy expenditure, the electrification of the oilfields alone representing an outlay of something like £1,000,000. It will, therefore, be at once apparent how advisable and necessary it is to continue to husband our cash resources on the same sound lines that have brought about such eminently satisfactory results in the past.

The American Embargo on Exports

Owing to the United States Government placing an embargo on the export from America of pipe and all drilling material, and to the uncertainty as to how long this embargo might not continue, it became imperative to husband carefully our stock of all

drilling materials until we could count on a resumption of shipments, and our drilling programme and testing operations had therefore to be to a considerable extent curtailed during the greater part of the year. It was most fortunate under these circumstances that when the embargo came into force we were in the happy position of having ample supplies of crude oil in sight for all our requirements, and a number of wells drilled to the top of the oil sand and ready to be brought into production whenever the oil was needed, and the termination of hostilities finding us so fortunately placed, removed all anxiety from our minds of being forced, by a protracted continuance of that embargo, into any material curtailment of our operations owing to shortage of crude oil in the fields. Now that the embargo has been removed we are beginning to get delivery of the pipe and drilling materials ordered so far back as April, 1917, and we shall therefore shortly be able to resume our drilling and testing operations on a greatly extended scale, and to carry out that programme vigorously we are adding largely to our drilling staff. All this, you will readily appreciate, means a very heavy expenditure, especially as prices of pipe and all drilling materials and stores have advanced so enormously—in many instances as much as three to four times—as compared with what they were before the war, and our fields expenditure and cost of production of crude oil will consequently show very large increases, during the next two or three years at any rate.

Fields Operations

Principally on account of the enforced curtailment of our drilling and testing programme, I have really not very much to say to you to-day in connection with our fields operations. In common with all the other oil companies operating in Burmah, our efforts during the year were mainly concentrated on the Beme district, in the Yenangyoung field, where, as I told you last year, an unexpectedly rich sand was struck at about 2,500 feet. Already, however, the territory is showing signs of the severe drain that has been put upon it, and though some wells still come in with large initial production, they as a rule fall off very rapidly. In regard to our crude oil position generally, though I feel it is rather superfluous for me to say anything on that subject in view of what I have said on more than one occasion in recent years, I can to-day confidently say that our drilling operations every year go still further to strengthen our belief that in our proved oil lands in Burmah we have ample reserves of oil to enable us to carry on our refining operations on their present scale for very many years to come.

Of our field operations outwith Burmah I much regret that I cannot give you anything in the nature of cheering or encouraging news. We have finally abandoned one of the districts we were testing in India, after drilling to a depth of 2,660 feet at a total cost of fully £40,000 without finding any oil. In another district under test in India we have reached a depth of fully 1,300 feet without encountering any oil. In the district in Assam, where, to begin with, we struck oil in fair quantities, but of very poor quality, and where during the past two years we have been struggling against water difficulties in every well, it has at last been conclusively proved that, owing to the poor quality of the oil, the small production per well, and the presence of so much water with the oil, the field cannot be made to pay under present conditions, and that the only hope of success lies in the possibility of striking oil in much larger quantities and free from water troubles at greater depths, and we are now arranging to test this possibility by drilling deeper.

Our interests in Trinidad unfortunately have continued to give disappointing results, and, so far, the new area briefly referred to by me last year as holding forth somewhat favourable indications—inasmuch as our operations in it were not so seriously subjected as in the older area to the sanding-up problem—has not come up to our hopes in the matter of production. At the same time active operations and the carrying out of new ideas for getting over this sanding-up trouble have been greatly retarded and hampered by both plant and labour difficulties, only recently eased by the termination of the war, and with greater facilities in these directions we and our associates in this enterprise are still hopeful of achieving success. We are now going ahead with the scheme for drilling and pumping by electric power in the Yenangyoung field, which but for the war we should have put in hand some considerable time ago. The delay, which was of course unavoidable, has unfortunately meant an enormous increase on the capital cost, which, as I have also mentioned, we estimate will now be in the neighbourhood of £1,000,000.

Even at this figure, we are confident that not only will there be a very considerable direct saving on the present extremely costly and, in fact, out-of-date method of drilling and pumping by steam power, but that there will also be many indirect savings and advantages through the use of electric power. While it will probably be three years before the scheme is completed, it will begin to come into partial operation, with resultant savings and benefits, considerably before that.

Operations at the Refineries

As regards operations at the refineries, I have already mentioned that we were fortunately able to keep these running at not far short of their maximum capacity throughout the year, which meant that the throughput was practically identical with that of the previous year. There were, however, considerable changes in the yields of the different products, and it is extremely satisfactory that, as I have already mentioned, these changes have been, generally speaking, in the direction of increases in the yields of the more valuable products, with decreases of products of inferior grades. The fuel consumption also shows a reduction of not far short of 1,000,000 gallons as compared with 1917, in spite of the throughput being practically the same.

The termination of the war means that we shall be in the position of going ahead with many schemes for modernising and improving our methods of manufacture, and this applies very specially to our refineries, where we can now take full advantage of the excellent results achieved by our works staff during the past two or three years, and which we could only take comparatively small advantage of owing to the impossibility, while the war lasted, of installing new plant on anything like a large scale.

Of our requisitioned fleet, the four ships which were in service in the danger zones all came safely through, and these, with the remainder of our fleet, have now been returned to us.

While on the subject of petrol I would express our gratification that under the new scheme of Imperial Preference petrol produced within the Empire is to have a preference of one penny a gallon over foreign petrol imported into this country. At the moment this preference will not amount to very much in the aggregate, but anything that will help to bind the Mother Country and our Colonies even more closely together, and also in any way tend to encourage the search for and production of petroleum within the Empire, is to be most heartily commended.

It seems almost unnecessary to tell you that the pipe line has worked practically without a hitch throughout the year. I do so really to mention that in order to increase the capacity of the line and to enable it to be operated at a reduced pressure—a great advantage as helping materially to lengthen the life of the line—we are installing two more pumping stations, another of these improvements which would have been carried through ere this but for the war. As a matter of fact, so convinced have we been of the necessity for this, that we made the greatest possible efforts to carry the scheme through during the war, but were refused the priority certificates which would alone have made this possible.

"Shell" Transport

The Increasing Uses of Liquid Fuel!

At the annual general meeting of the "Shell" Transport & Trading Co., on Tuesday, the chairman (Sir Marcus Samuel) made a statement of great interest respecting the ever-increasing uses of liquid fuel.

An Anxious Year

The year under review (he said) was one of great anxiety in which it was wholly impossible for the best results to be obtained, seeing that trade was hampered in every direction, and we were not masters in our own house. It cannot be too clearly understood that the great bulk of our profits is made outside of the United Kingdom and, indeed, outside the British Empire, and we have been largely benefited because, selling for the most part in Eastern currencies, exchange has acted in our favour owing to the great rise in silver. Whilst natives have not in their currencies paid very material advances in price, the sterling remitted has been much in excess of that of previous years.

Another factor in your prosperity has been the increased output of crude oil in many of the most lucrative fields in which our

companies operate. Whilst it has been impossible to bring into our balance-sheet for the year under review revenue from such fields as Russia, Rumania, Mexico, and Venezuela, it is gratifying to announce that the Anglo-Egyptian Oilfields Company has been able to pay the whole of the arrears on its Six per cent. Income Bonds and Cumulative Preference shares, as well as a dividend of 25 per cent. on the Ordinary shares. Apart altogether from the satisfaction with which we welcome the maiden dividend of the company, we are glad, for the sake of Egypt itself, that it is producing some portion of its fuel requirements. The chaos at present prevailing has delayed the fruition of our plans for working larger territories in Egypt. I fear the day is yet far distant when the Egyptian markets can be supplied entirely from local production. The "Shell" Company of California has also declared dividends which are incorporated, in so far as we are entitled to them, in our balance-sheet, but it has been on a conservative basis, and we confidently look for larger revenue from that source in the future.

The War

It is in the losses incurred by our fleet, owing to the war (in which, I fear, we have been far more heavily hit than any of our competitors) that we have suffered most, and the dividends received from the Anglo-Saxon and the Asiatic Petroleum Companies are both materially less than in the preceding year. The losses, owing to torpedo attacks, comprised no fewer than twelve steamers, having a carrying capacity of 75,000 tons, whilst a further nine of our large ships were damaged through mines and torpedoes, amongst them one being torpedoed twice. These ships, however, were repaired during the war, and it was only impracticable to do this with one steamer, the "Strombus," having a carrying capacity of 8,500 tons.

It is a splendid tribute to our marine department that, during the war, they were able to have completed in the United States three fine vessels, in Holland and partly in the United Kingdom seven (of which one ship was only delivered on January 18, 1919), and in England itself two ships were built. We were further fortunate enough to obtain through purchase eight steamers, motor ships, and sailing ships, and a powerful tug. The total capacity of the fleet of the combined companies at the beginning of the war was 255,965 tons, and at present it represents 263,746 tons, in addition to the "Strombus," which we hope one day may resume service. (Hear, hear.) We cannot be sufficiently grateful to our magnificent officers and crews, who stuck to their posts throughout, and remained loyal and devoted to the companies. (Cheers.)

You will be glad to know that the loss on the torpedoed ships was almost all insured outside our own insurance fund, but seeing the enormous advance in the price of new tonnage (which is practically three and a half times as much as before the war), the amounts recovered will not suffice to buy the equivalent. You will, no doubt, have observed with satisfaction that the aggregate of the insurance funds of the Bataafsche Petroleum Maatschappij amounts to £4,083,333, the cessation of the war warranting the amalgamation of these funds.

It has again afforded your directors the most intense satisfaction to give a participation in our prosperity to all our employees through the provident fund, which now amounts to about £2,000,000 (cheers), the company, as it has been their practice to do, having added 25 per cent. of the total of the salaries of the employees in addition to the 10 per cent. contributed by the employees themselves. (Hear, hear.)

In view of the very important part that science now plays in regard to petroleum, the Anglo-Saxon Petroleum Company have contributed £50,000 as their share towards the founding of an endowment fund devoted to chemical research at Cambridge University. I hope great national benefit may result from this endowment in the future. Our relations with our friends, the Burmah Oil Company, are most cordial, and, in this endowment, as in other matters of Imperial interest, we continue to co-operate.

Growing Consumption of Liquid Fuel

As we had very confidently anticipated, liquid fuel is entering more and more into consumption. How greatly this has been brought about by the appalling falling off in the output of coal it is impossible to determine. Suffice it to say, that the production of coal in the United Kingdom during 1918 was about

70,000,000 tons less than in 1913, the year prior to the outbreak of war. Pearing in mind that important coalfields in France have been destroyed, and that apart from the coalfields which the Germans have lost, the production from those remaining is much less than before, the gravity of the position as regards the fuel of the world will be at once manifest. Naturally, all eyes have been turned to find what relief could be obtained from petroleum, and here we find that the total of the world's production of liquid fuel cannot at present be estimated at much more than 40,000,000 tons per annum. A very large part of that was already placed before the shortage of coal made itself felt. It will be clear that the substitution of liquid fuel for coal can only be possible to a comparatively small extent. Those who exercise forethought and vision of outlook will be best off, and the latecomers in many of the markets where liquid fuel has either entirely replaced or is rapidly replacing coal will find themselves left in the lurch. Great alleviation of the position would be secured if petroleum, instead of being used in the most wasteful form possible—namely, by using it as fuel—were largely utilised in internal combustion engines, and I hope to see this method of its employment extended rapidly.

This company's position for the supply of liquid fuel is quite unique. Your directors had long foreseen its advent, and by joining forces with the Mexican Eagle Oil Company and other large producers, have placed themselves in the position of being able to give security of contracts to their customers throughout the world in a manner which is not possible to any other petroleum company.

Another branch of your business to which I must refer is that of motor spirit. The familiar red cans so beloved by motorists are once more in evidence. If I could unfold the whole history of their temporary suppression and the appearance of the miserable stuff which motorists have had to be content with during the war, misnamed "petrol," it would be a very interesting story; but I may not lift the veil at present. Suffice it to say that Shell spirit is now again available to all who desire to obtain it, and we have no misgiving as to supplies being sufficient to meet the ever-growing demand.

The flight of the Atlantic by Captain Alcock and Lieutenant Brown has stirred the imagination and kindled the enthusiasm of the entire world. It is with profound satisfaction, and, indeed, with joy that we have been able to announce that that flight was accomplished on Shell spirit. As prepared for aviation to-day, Shell spirit possesses qualities which are absolutely unique. We are persuaded that when all the elaborate tests and experiments which we are now conducting are completed, it will prove capable of giving to aviators 15 per cent. to 20 per cent. greater mileage than any known petrol.

Company's Prospects

It will no doubt be disappointing to you, as it is to us, that we have had to postpone the issue of the new shares, owing to the refusal of the Treasury to sanction it until the closing of the lists for the Victory War Bonds, but, of course, this is only deferred. The issue will be made as soon as practicable after the sanction is obtained, in the proportion already announced, of one share for every two shares now held, at par, to all shareholders on the register on June 16, which was the date when we closed the books for the preparation of our dividend warrants payable on July 5.

There will be posted to every shareholder, with the notice allotting the new shares, a booklet entitled "The Shell that hit Germany hardest." It gives in a brief, but most interesting manner, the history of something of what this company has attempted and accomplished in the cause of the Allies. I ask every shareholder to read it carefully, and to pass it on to as many friends as possible, because it cannot be too strongly emphasised how much private enterprise, properly directed, may assist the State.

As for so many years, it is again our privilege to assure you of the continued prosperity of the business. So far as we can see, there are no clouds on the horizon, and, with the complete freedom which we hope will soon be restored, with alleviation from taxation in the form of crippling excess profits tax (partly removed already in Great Britain, and entirely in Holland) your directors look forward with great confidence to presenting to you in due course a balance-sheet for 1919 equally satisfactory to those which it has been our lot to submit to you for so many years.

Sir Montagu Turner remarked that a great deal was heard as to the nationalisation of industries and the wonderful results which would follow. In his opinion, the results of nationalisation, if carried through, would be the greatest blow to British trade that it had ever received.

A dividend equal to 35 per cent. free of income tax was declared, and the retiring directors (Mr. S. Samuel, M.P., Mr. W. F. Mitchell, and Sir Reginald MacLeod) were re-elected.

Electro Bleach and By-Products

Depletion of the World's Markets

At the annual meeting on Tuesday, dividends were declared making the final dividend on the Preference shares 7 per cent., and the final dividend on the Ordinary shares 12½ per cent.

The chairman (Mr. H. J. Mackinder, M.P.) in reviewing the position, reminded the shareholders that the company was a peace company and not a war company. It was floated four months before the war. That fact had told against them up to now; he hoped it was going to tell in their favour.

Dealing with the early difficulties of the company in consequence of the outbreak of war he said: There were many months of hard work and anxiety which followed, and then there came—after, I think, a couple of years—the excess profits duty. We had no pre-war standard of profits; therefore, we had to be content with a small percentage on a small capital. We had to hand over a large part of our profits to the State. Yet our total profits were at no time during the war in excess of the estimates which we published in our prospectus, which was drawn up in peace time; and, though I make no complaint on the contribution which we have made to the State, yet I now say with some pride that our company has made good to-day. It has been through no war profiteering; it has been in spite of the war. We have throughout tried to beat the Government fairly. I believe we may claim to have rendered in proportion to our size a very real service to the Armies in the field, and at the same time we had made our policy to be considerate of our private customers. With regard to the £10,000 as a special appropriation for ordinary repairs, that is the largest amount which has been allowed by the Inland Revenue authorities in order to meet the cost of making good the damage done to certain parts of our plants by work under war conditions. In certain crises of the war it was essential to press forward without any regard to the economic consequences. If the £10,000 had not been so allowed, £8,000 of it would have gone in excess profits duty. Our total of excess profits would have been £16,600 paid over to the Government.

In regard to the whole financial position of the country, I feel that we may consider that we start on our peace career with no mean achievement behind us. During these critical years, when we have been subjected to an excess profits duty taken through no windfalls due to the war, but through the natural growth of the company, we have succeeded, in the first place, in paying off the whole of our preliminary expenditure. The condition of our plant is now better than it has ever been and is much larger. The new fresh water reservoir has stood us in good stead during the recent drought. The brine flow is steady, and we have three shafts available, though we have not to work all three at once.

On the very day Armistice was signed we received a telegram from the Ministry of Munitions telling us to shut down all munition work and resume supplies to our private customers. That was a pretty considerable shock to give to any industrial concern. Owing to the foresight of our managing director, and the activity of our sales manager, we have not experienced the difficulties we anticipated. As a fact, our output was switched over from war-like means to peaceful means with almost as much ease as you switch over an electric current. Only half of the current year has elapsed, but in view of the anxiety which all feel in regard to these early months, when conditions change practically every week, I feel justified in telling you that though trade is only slowly resuming its activities, yet, on the whole, our company has not been unprosperous. With regard to the future, I am not one who takes a pessimistic view, and provided that good faith is maintained I cannot help feeling that we shall reap the reward of victory. Of course, we must be practical, and I feel that the most practical thing we can do at the present moment

is to make a success of the loan which the Government is asking from the country. If the loan is not a success we shall not have taken one essential step to secure the conditions which will give us an increase of employment and an increase generally of commercial activity. The markets of the world are depleted. The demands of the world are greater than they ever were before. The standard of living has been raised among the masses of the people, and if we use our increased means of productivity, there is no reason why that standard should be lowered. If we are to maintain the standard we must work. Our race will be true to its best character, and if it is, then our trade, at any rate, need have no fear in regard to the future. We are making things which are wanted by certain great staple trades—textiles, paper, and so forth, and these staple trades prosper, not from the luxuries of the few, but from the demands of the many. I do not believe we are going to have sudden peace in the world, but I hope and pray that in the next day or two we may have peace between ourselves and our great antagonist, Germany. Not for years to come are you going to see a settlement in the East or the Near East.

National Union of Scientific Workers Fifty New Members in Birmingham

At a meeting on Monday evening in the Birmingham Chamber of Commerce, presided over by Sir William Ashley, Vice-President of the University of Birmingham and Dean of the Faculty of Commerce, it was decided to establish a Birmingham branch of the National Union of Scientific Workers and a provisional committee was appointed to organise the branch. The attendance of industrial chemists, chemical engineers, &c., and members of the laboratory staffs at the University and other institutions, was of a representative character.

Professor Sir William Ashley said that when one spoke of scientific workers, one thought, without strictly defining that body, of laboratory workers—people engaged in scientific work in laboratories. Twenty years ago this was a small class in England, even if one included all the staffs of the universities and other scientific departments. There were then few men employed as industrial chemists in the laboratories established by business firms. But in recent years the number had largely increased, and it appeared to him quite clear that the number would grow rapidly in the near future. Our universities were going to have, he hoped, very much larger scientific staffs; and chemical laboratories created in great and small businesses were going rapidly to multiply. Besides those two directions, we had seen in recent years the appearance of a new class—laboratories established by public authorities in connection with industrial research, and those created by the Government, such as the National Physical Laboratory, and the laboratory connected with the work of the National Health Commission. It was apparent that governments and municipalities would create more of such institutions. Therefore, he foresaw a development of this new category of scientific workers.

Hitherto, we had been accustomed to associate combination chiefly with manual workers, but some of the oldest professions had long had their organisations which served substantially the same purpose. It seemed to him most natural that this new body of scientific workers should form its own association. The body of scientific workers could never be a closed body in the sense that some of the industrial unions were, because of the varied work that a scientific man or woman might do, but it seemed clear that an increasingly large proportion would continue for the whole of their career in one class of work. In these circumstances it was desirable that there should be an organisation, part of the objects of which should be to safeguard, reasonably, economic interests. They wanted, moreover, to strengthen and maintain professional standards, and to acquire experience and knowledge which should be at the disposal of entrants into the profession.

Applied Science in Industry

Mr. O. L. Brady, D.Sc., F.I.C. (President of the National Union) said the Union was formed in order that science should occupy its proper place in our national life. The war had brought out the great neglect of science in pre-war days, and many war troubles, brought about by the lack of scientific preparation,

might have been avoided. The only hope of maintaining our industrial and trading position among the nations of the world was by the intense application of scientific principles to industry. Those who had any experience of the attitude of the manufacturer to science realised that a great deal had to be done. Hostility was still shown by some manufacturers towards scientific people in general. As a matter of fact, the general public did not know what the scientific worker was, and still looked upon him as some extraordinary individual who liked to play with test tubes and bits of wire in the laboratory; they did not realise the part the industrial chemist played in industry. It was, therefore, felt desirable to educate the public on the aims of the scientific worker and to get for science a position which was comparable with its importance to the industry of the country. The supreme aim of the Union would be to advance the interests of science, pure and applied, as an essential element in the national life, by the promotion of scientific research and to secure the public endowment of such. They felt further that scientific and technical departments in the public service and all posts involving scientific knowledge should be under the direct control of persons having adequate scientific attainments.

The Secretary announced an anonymous gift of £50, and about fifty members were enrolled.

Chemical Engineers at Birmingham Gas Works

Inspection of Carbonizing Plant

THE members of the Society of Chemical Industry (Birmingham and Midland Section) paid a visit on Friday week to the Windsor Street works of the Birmingham Gas Department. The visit made a strong appeal to the chemical engineer, on account of the magnitude of the operations, of the evidence on all sides of research work, and of the introduction of new features (end producers) on ranges of seven-ton retorts. Objects of interest were the 20-ton per day dehydrating plant, on which prepared tar is made for the Birmingham roads; a cyanide plant (Williams process), capable of dealing with 10-million c.f. of gas per day, containing 3½ lb. of ammonium and sulphur cyanide, and having an efficiency of 90 per cent.; and the continuous working Woodall-Duckham vertical retort. The last of the horizontal retorts is being dismantled. In 1912 the department installed two ranges of 5-ton retorts, and these proved eminently successful. During the war a further range of 5-ton retorts was installed, as well as a range of 7-ton retorts with end producers, and two further ranges of 5-ton retorts are in course of construction. The waste gases from each of the new ranges are passed through waste heat boilers of the Bedcock-Wilcox multitubular type. There appears to be no difficulty in evaporating 7,000 lb. per hour per boiler through each range of retorts. When the boilers are in operation, the necessary pull on the setting is controlled by fans on the waste gas at the bottom of the stacks. Steaming on the retorts is in full operation, and it is found that, under normal conditions, the make of gas per ton of coal may be increased to about 17,000 c.f. The yield of ammonia and tar is also increased. Seven-ton retorts are not novel to Birmingham, though only one other works possesses them. These large retorts (seven tons of coal through each per day) are working with great smoothness, and, but for the war, the extensions would have all been seven-ton retorts. With the new use of end producers, the gas is distributed to each of the beds of retorts, thus effecting great administrative economies.

Dr. Morrell (Wolverhampton), the chairman of the Birmingham Section, warmly thanked Dr. A. W. Smith, the chief chemist at the Gas Works; and Mr. J. Foster and Mr. G. C. Pearson (engineer and works engineer respectively), for the arrangement for the visit.

On Thursday, the Saltley Gas Works of the Birmingham Corporation were visited by the members of the Chemical Society of the University of Birmingham. The main point of interest was a new test installation of vertical retorts which are nearing completion and which were built for the chief chemist with a view to improving the existing systems from the point of view of steaming and "put through." In the gas world, these features are of more than ordinary interest, and are the result largely of scientific co-ordination on the part of chemists and engineers.

The Indian Market

The British Manufacturer's Chance

(FROM OUR OWN CORRESPONDENT.)

THERE is hardly a commercial nation of the world to-day which is not turning towards India as a profitable market for innumerable products. The commercial history of India (if it may be put that way) lies in the future, and with the Swadeshi movement (*i.e.*, self-support for India) in full swing, with plenty of money available, and with general enthusiasm, the industrial problems of India are full of encouragement and interest. But, with all these commercial virtues, the experienced man is wanting. To the trade papers of England the Indian resident turns for the names and addresses of manufacturers and shippers, and also for trade education. Consequently, the trade journal is destined to have a great future, and our foreign competitors fully realise the fact.

The balance of trade in favour of India during fifty-one months of the war (August, 1914, to October, 1918) amounted to over £83,500,000, which gives an annual average of nearly £20,000,000.

During the official year (April, 1918, to March, 1919) the imports of merchandise into India were valued at £112,700,000, or an increase of £12,400,000 over the previous year. Among the imports were:—

Metallic ores	Value	£21,080
Oils	"	£2,480,000
Chemicals	"	£2,813,000
Dyes and colours	"	£1,940,000
Instruments and tools	"	£3,907,000

The exports of Indian merchandise, during the same period, were valued at £159,530,000, or an increase of £3,908,000 over the previous year.

The Aims of America and Japan

Two powerful competitors for the Indian market are America and Japan. To maintain the foreign trade of America the United States authorities have voted about £215,000,000 for export business. The exports during December-January last were valued about £300,000,000, the largest in any period in the history of American commerce. Of this, sixty-two per cent. went to Europe, and nine per cent. to Asia. And Asia and Oceania show indications of requiring a much larger share. The result is that great activity prevails in American and Japanese commercial circles to obtain a still larger proportion of India's trade.

It is as well for us to note in this country that foreign competitors are giving great attention to overseas trade, and are studying questions relating to local banks and banking, stock exchange matters, transportation of merchandise, commercial exhibitions, laws and regulations relating to business, customs, tariffs, prohibition and restriction of imports and exports, names of local merchants and buyers, filing of manufacturers' catalogues and trade journals, &c.

At the present time a movement is on foot to establish an "Indian Society of Engineers." Among schemes, one notes that the Bombay water authorities are to provide 3,000,000 gallons daily of chemically purified and filtered water. As to other developments, it may be mentioned that the British Burmah Petroleum Co. produced in 1918 502,400 barrels of crude oil against 442,000 in 1917, but the consumption of oil to provide power for pumping and drilling represents fifteen per cent. of the gross production, and remedies for curtailing this high consumption are now being sought.

Local Industries

As regards local industries it is difficult to give more than a brief outline as to conditions at the present time, but the writer believes that the following information is not generally known, and will be of interest to manufacturers in England. For instance, resin tapping has commenced, and refining is in operation at the Government factory at Bareilly. The mica industry at Gaya has had a good year, and lac is in great demand; and it is of interest to note that the mica mines at Mahesari now employ over 2,000 daily workers. Mica deposits were discovered in Augul and Gambalpur, where ruby mica was also found.

In these days of synthetic dyes we hear a good deal of the decadence of the indigo industry, but recently the indigo farms at Champaran, Muzzaffarpur, and Darbhanga have done exceptionally well. In this connection it may be noted that an improved method of preparing Indian from indigo yielding plants has been introduced by Mr. B. M. Amin. The fresh leaf is extracted with hot water, lime is added to precipitate impurities, and the liquor is filtered and concentrated by evaporation, the indican being extracted by means of acetone. The extract is then evaporated and the aqueous solution is cooled in ice to effect crystallization, yielding crude indican hydrate. The hydrate is afterwards purified by dissolving in alcohol and precipitating with benzene, which gives pure anhydrous indican in small crystals.

As regards sulphuric acid it may be mentioned that acid plants are now in operation at Kerlti and Sakchi, and the Sanni Shoran sulphur mine has become commercially prosperous. Looking to the future, "The India Paper Pulp Company" is negotiating for a twenty-one years' concession to extract bamboos for the manufacture of paper pulp.

Advice to Manufacturers

Manufacturers and shippers would do well to post concise and illustrated pamphlets of any article likely to be useful to probable users in India. The pioneer in India looks to the efficient and professional man in England for the helping hand, and he is anxious to get on, improve, and to expand. Trade journal announcements and pamphlets are of great value. Many managers and assistants have their library of text books, but literature giving practical, theoretical, or mechanical information always finds a ready sale, while labour-saving appliances and machinery of all kinds and varieties and for all purposes are in great request. In this respect it may be noted that the general duty on imported articles is seven and a half per cent. *ad valorem*; to which there are a few minor exceptions.

Imperial Institute of Patentees

A NEW association is being formed by patent owners and manufacturers with the object of protecting their interests. The association will probably be known as the Imperial Institute of Patentees (Inc.), licence from the Board of Trade having been applied for. A preliminary meeting will take place in the Pillar Hall, Cannon Street Hotel, on Thursday, July 10, at 2.30 p.m. Mr. Godfrey Cheesman, the general secretary of the National Union of Manufacturers (Inc.), has been asked to act as organising secretary to the new association. Temporary offices have been secured at 6, Holborn Viaduct, London, E.C. 4, and all interested in patents and desiring to attend the meeting should apply for tickets and other information. The chair will be occupied by Sir Joseph Lawrence, Bart., of Linotype and Machinery, Ltd., who will be supported by Sir Herbert Nield, K.C., M.P., Mr. George Terrell, M.P. (Tyer & Co.), Sir Richard Cooper, Bart., M.P. (William Cooper & Nephews), Mr. C. H. Skinner (Lilley & Skinner), Mr. Percy G. Donald (Rownson, Drew & Clydesdale), and others.

From Week to Week

Messrs. Baldwins, of Swansea, are proposing to erect a big steel plant in the west end of Toronto.

Mr. Courtauld, head of Messrs. Courtaulds (Ltd.), has given £500 to the Chelmsford War Memorial Committee.

Political funds of the British Iron and Steel and Kindred Trades Association show a credit balance of £13,303. The assets exceed £297,000.

The late Sir William Hood Treacher, K.C.M.G., of Whittington Avenue, E.C., director of a number of rubber companies, has left estate valued at £61,181.

The production of manganese for 1918, says a Washington message, was 304,366 tons, which is two and a-half times the production for 1917, which was the previous record.

Mr. W. E. Hardy, the manager and engineer of the Bath Electric Tramways, Ltd., is introducing the "Thermit" process of rail-welding on his company's system.

A scheme has been established by the Iron and Steel Trades Confederation to enable members to purchase their houses, 75 per cent. on the purchase price being lent on fair terms. Over £20,000 has already been lent.

Mr. C. R. Baker, a director of Joseph Watson & Sons, Ltd., Whitehall Soap Works, Leeds, has been elected president of the United Kingdom Soap Makers' Association for the ensuing twelve months.

Mr. Humphrey R. Raikes, B.A., major in the Royal Air Force, A.F.C., formerly Williams exhibitioner of Balliol, first class in the final Natural Science School (Chemistry), 1914, has been elected to a Tutorial Fellowship at Exeter College, Oxford, for the teaching of chemistry.

A fire broke out last week on the premises of Messrs. Menley & James, Ltd., manufacturing chemists, and about 20 lb. of salicylic acid was destroyed in a condensing chamber on the ground floor, whilst the chamber and the rest of the contents were slightly damaged.

Owing to fireworks that were thrown from the street a fire was caused on Saturday at Shorts Gardens, Holborn, W.C., premises occupied by Messrs. Crosse & Blackwell, Ltd., export oilmen. As a result a quantity of stock was damaged by fire in the yard, and the gates had to be smashed open and were consequently damaged.

Maisels Petroleum Trust, Ltd., have received through the Lucey Manufacturing Corporation a report on the position of ten of the company's wells in Bordeni, Rumania, from which it appears that five of these were damaged or plugged at the time of the evacuation, but can be cleaned or repaired, and the others can be deepened without difficulty to reach productive levels.

As the result of a light thrown down, a fire broke out on Monday, at Point Pleasant, Wandsworth, S.W., the premises of the Aluminium Plant and Vessel Co., Ltd., manufacturers of chemical plant. A corrugated iron and timber shed building, used as store (and the contents), was damaged by fire, heat, smoke and water.

A Belgian metal combine, La Construction Metallique, has just concluded a contract with the American Army for all the machine-tools in their war material, either new, in use, or still in the United States. The prices are to be those of 1914 increased by about 55 per cent., the buyers to have credit for three years at moderate interest. These terms apply only to the machines intended to replace those stolen by the Germans.

The following have been re-elected in connection with the British Artist Colour Manufacturers' Association:—President, Mr. W. E. Killik (Winsor & Newton); hon. treasurer, Mr. W. G. Rowney (Rowney & Co.); committee, Mr. C. J. Wild (Reeves & Sons), Mr. C. P. Park (C. Roberson & Co.), Mr. E. F. Chapman (James Newman), and Mr. Vincent Nello (Madderton & Co.); hon. secretary, Mr. G. R. Cheesman, 6, Holborn Viaduct.

A Proclamation published in the *London Gazette* of June 27 prohibits the importation into the United Kingdom of the following articles:—Chemicals of all descriptions; electrical goods and apparatus, including electrical plant and machinery of all kinds, and insulating materials of all descriptions; scientific, mathe-

matical, and optical instruments; tungsten powder and ferro-tungsten. The Proclamation does not apply to goods imported under licence given by the Board of Trade.

Oil drilling in the Peace River district is attracting attention, and the prospects offered are stated to be most encouraging. Several prospective wells show splendid results. One well, located in a township on the high prairie, where drilling commenced in February, has been sunk to a depth of 900 feet, and the oil showing makes for good production and splendid development. The general opinion prevails that the oil production prospects are enormous.

A special summer convention of representatives of trade unions, employers' associations, and other societies concerned, will be held on August 12, 13, and 14, at the Midland Institute, Birmingham. The convention, organised by the Industrial League, will be opened by the Lord Mayor of Birmingham, and Mr. G. H. Roberts, M.P., will deliver the presidential address. Mr. J. R. Clynes, M.P., will speak on "Labour in its Relation to Industry."

Last week a fire broke out, owing to the overheat of a drying stove, at the premises of Messrs. Stafford Allen & Sons, Ltd., drug grinders, of 7, Cowper Street, City Road, London, E.C. A back building of five floors, about 70 ft. by 40 ft., used as drying room, milling room, and store, had the drying store in the basement, and the contents damaged by fire, whilst the rest of the buildings and the contents suffered slightly by heat, smoke, and water.

Lord Inchcape has presented £10,000 to the University of London as a contribution to the fund now being raised to establish a commercial degree. The trustees of Sir Ernest Cassel have promised £150,000 if a like sum is subscribed before October next. The closest possible touch is being kept by the University with the business community over the proposal. Sub-committees, representing every important industry, have reported on the needs of their respective employees, and the course has been framed in the light of their suggestions. Lord Inchcape is chairman of the sub-committee dealing with the shipping and ship-building industries.

One of the secrets of commercial success is the utilisation of the apparently waste product. In this respect English manufacturers have made great progress in the past decade. The bonfire or miniature "destructor" method of consuming shavings and sawdust is no longer associated with up-to-date plants. One of the most successful sawdust gas-producer plants was installed some years ago at the Great Western Railway Company's Swindon works, and in normal times supplied ample current to drive the mill machinery. The British and Colonial Aeroplane Company at Filton, near Bristol, adopt similar methods in dealing with the waste from their wood-working department. Their power-house is equipped with gas engines direct-coupled to dynamos, and the waste sawdust is removed from the shops by large exhaust fans.

Before the Recorder (Sir Forrest Fulton, K.C.), at the Central Criminal Court, on Friday, June 27, Herbert Clarence Leonard, 27, chemist, was brought up in custody and pleaded not guilty to an indictment which charged him with obtaining £50 by false pretences from Messrs. A. & E. Carreras, perfumers, of 207, King Street, Hammersmith, W. 8. It was stated that the prosecutors were the proprietors of a preparation called "Enolin," which they had put on the market. In March they advertised for a window dresser, their idea being that they should dress the windows of chemists who purchased their goods. The prisoner answered the advertisement and was engaged. The prisoner told the prosecutors that he thought he could get a substantial order from Timothy White & Co., the well-known chemists, and accordingly he was sent to Portsmouth, being given £30 for expenses and a range of samples. Later the prisoner telegraphed from Portsmouth that he had received a handsome order, and asked for £50 to be sent to him, as he had to dress a large number of shop windows. That money was forwarded to him, but, said counsel, the whole story was an artistic lie suited to the capacity of a window dresser. The jury found the prisoner guilty, and two previous convictions were found against him. He deserted from the Army in September, 1917, after three months' service, and was still an absentee. The Recorder said the prisoner was a worthless man, and he would have to go to prison for twenty months, with hard labour.

References to Current Literature

Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used will be published at suitable intervals.

British

- ACETONE.** The production of acetone and butyl alcohol by a bacteriological process. H. B. Speakman. *J. Soc. Chem. Ind.*, June 30, 161-168T. A valuable paper dealing principally with the engineering side of the problem.
- COAL.** Reports of the Coal Commissioners. *Parliamentary Paper, Cmd.* 210, price 4d. Contains four interim reports on nationalisation, including that of the Chairman, Mr. Justice Sankey.
- Coal Production, 1913-1919. *Board of Trade J.*, June 26, 793-797. Details are given of returns relating to output in various districts of Great Britain.
- COMMERCIAL.** German chemical companies' results. *Chem. Trade J.*, June 28, 566.
- COSTING.** Cost analysis in chemical manufacture. *J. Soc. Chem. Ind.*, June 30, 224-226R. "Notes on the Government 'Reports on Costs and Efficiencies in H.M. Factories,' with graph, dealing with the manufacture of nitric and sulphuric acids. Practical Costing Methods. E. M. Taylor. *Chem. Trade J.*, June 28, 567-569.
- FRANCE.** Some devastated factories in France. W. F. Reid. *J. Soc. Chem. Ind.*, June 30, 223-224R. Illustrated account of visit to Chauny. (See also *CHEMICAL AGE*, No. 2, p. 45.)
- FUEL.** Problems in the utilisation of fuels. R. F. Bacon and W. A. Hamot. *J. Soc. Chem. Ind.*, June 30, 161-168T. Deals with the utilisation of low-grade fuels, coal washer waste, American oil shales, &c.
- GAS.** The Fuel Research Board's Report and its Effect on Manufacturing Methods. *Gas World*, June 28, 550-554. Discussion opened by J. Bond, at the meeting of the Manchester District Institution of Gas Engineers.
- LUBRICATION.** Note on static friction and on the lubricating properties of certain chemical substances. W. B. Hardy and J. K. Hardy. *Phil. Mag.*, July, 32-48. An interesting contribution to the theory of lubrication.
- MANURES.** The agricultural value of organic manures. E. J. Russell. *J. Bd. Agric.*, June, 228-247. Experiments show that Peruvian guano is superior to other manures on the basis of nitrogen content.

Colonial

- AMMONIA.** Manufacture of ammonia and ammonium compounds. M. Rindl. *S. Afr. J. Ind.*, May, 463-466. Notes on production in South Africa.
- EXPLOSIVES.** Inspection of explosives and chemicals during the war period. J. R. Donald. *Canad. Chem. J.*, June, 187-191. Address by the Inspector of Explosives for the Imperial Ministry of Munitions, Canada.
- GLASS.** Glass, with special reference to its production in South Africa. P. A. Wagner. *S. Afr. J. Ind.*, May, 436-449. General paper, with notes on South African glass sands, &c.
- INSECTICIDES.** Dips and dipping. H. H. Green. *S. Afr. J. Ind.*, May, 409-418. A general article.

French

- ALGERIA.** Mineral resources of the French Colonies. I, Algeria. *Rev. Prod. Chim.*, June 15, 279-282.
- ANALYSIS.** Electrolytic determination of metals without the use of external source of electric energy. M. François. *Ann. Chim. Anal.*, June 15, 178-180.
- BOILERS.** Boiler feed water. J. H. Mathieu. *Rev. Prod. Chim.*, June 15, 281-284. Deals with purification, and the analysis of purified waters.
- IRON.** Properties and preparation of electrolytic iron. G. Vié. *Ann. Chim. Anal.*, June 15, 175-176. Deals specially with the magnetic properties.

American

- COKE.** Mammoth coke plant. F. F. Marquand. *Blast Fur. and Steel Plant*, June, 256-263. A description of the Carnegie Company's plant at Clairton, at which 12,500 tons of coke is treated daily.
- EMULSIONS.** Emulsification of water and ammonium chloride solutions by means of lampblack. W. C. Moore. *J. Amer. Chem. Soc.*, June, 940-946. Interesting experiments on the preparation of kerosene emulsions by means of lampblack are described.
- FUEL.** Economical fuel burning equipment. J. G. Worker. *Blast Fur. and Steel Plant*, June, 277-280. The combined boiler, stoker, and economiser efficiency should reach 80 per cent.
- STEEL.** Government steel plant. S. W. Stratton. *Blast Fur. and Steel Plant*, June, 268-270. Notes on the U.S. Bureau of Standards plant, and the co-operation of the Government with manufacturers.
- TASTE.** A new theory relating constitution to taste. E. Oertly and R. G. Myers. *J. Amer. Chem. Soc.*, June, 855-867. According to this theory the sweet taste of organic compounds depends on the simultaneous presence of two groups, glucophores and auxoglucs.

German

- APPARATUS.** Laboratory condensers. O. Faust. *Z. angew. Chem.*, June 10, 183-184. Notes on new reflux and other condensers.
- Standardisation of laboratory apparatus. J. Dathe. *Chem. Zeit.*, June 5, 320-330. Describes the steps being taken in Germany to limit the number of sizes of apparatus.
- GAS.** Water-gas production in horizontal retorts, and improvements at the Frankfurt-Heddernheim Gas Works. *J. Gasbeleucht.*, May 17, 253-260. A number of tests are recorded.
- METALS.** Studies on metal-melting losses. E. H. Schulz and H. Winkler. *Metall u. Erz.*, May 22, 215-218. Deals with the melting of brass, aluminium and zinc, and certain alloys.
- PATENTS.** The rights of employes as inventors. E. Jänecke. *Z. angew. Chem.*, June 10, 182-183.
- PLANT.** Concrete and wood for making chemical plant. E. Hausmann. *Chem. Apparatur*, Mar. 10, 35-36.
- Developments in plant for inorganic chemical industries during the war. *Chem. Zeit.*, June 5, 330-331. (See also *CHEMICAL AGE*, pp. 17 and 45.)
- POTASH.** Origin of the German potash deposits. E. Jänecke. *Z. angew. Chem.*, June 10, 178-181. The author favours the theory that the deposits were formed from sea water.
- SULPHURIC ACID.** Mineral acid industries in 1917-1918. K. Reusch. *Chem. Zeit.*, June 10, 341-342. Deals with the production of sulphuric acid and sulphate of ammonia.
- ZINC.** Permeability of zinc retorts. O. Mühlhaeuser. *Metall u. Erz.*, May 22, 219-223. Describes studies of the conditions governing porosity.

Miscellaneous

- TAR.** Rapid estimation of water in tar. P. Smit. *Chem. Weekblad*, June 21, 852-854.

The catalogue of "Lewis's Medical and Circulating Library" (136, Gower Street, London; 12s. 6d. net, to subscribers 6s. net) contains a classified index of subjects, with the names of the authors who have written on them. The library supplies on hire works on medical literature and general science to individual subscribers and book clubs, and the range of subjects is comprehensive.

Patent Literature

Complete information is only obtainable by purchase of the original patent, abstracts being rarely sufficient. Where complete specifications are "open to inspection" but not yet published, fuller information will usually be given in order to obviate a personal visit to the Patent Office. The inclusion of foreign patents is under consideration, and this and other improvements in THE CHEMICAL AGE service will be developed in accordance with the suggestions and requirements of our subscribers. Illustrations and diagrams will be used as far as possible to shorten written descriptions.

Applications

(June 16 to 21, inclusive.)

- Aluminous materials, process for purifying. 15,296. Carborundum Co.
 Ammonia, production of. 15,149. A. Rollason.
 Carbazole, isolation of. 15,440. Burt, Boulton & Haywood, and F. D. Miles.
 Carbonization. 15,324. The Underfed Stoker Co.
 Cellulose derivatives, manufacture of. 15,191. H. Dreyfus.
 Decolorizing materials. 15,323. The Catlin Shale Products Co.
 Heat treatment or carbonaceous matter. 15,573. Techno-Chemical Laboratories, Ltd., and C. Dellwik.
 High temperature reducing operations. 15,318. Techno-Chemical Laboratories, Ltd., and C. Dellwik.
 Nitric acid, process for making. 15,205. General Electric Co.
 Oils, apparatus for hydrogenating. 15,419 and 15,422. Blair, Campbell, and McLean, D. A. Blair, and J. L. Ferguson.
 Paints, manufacture of. 15,373. J. E. Schneider.
 Reactions, processes for carrying out between gases and solid substances at high temperatures, also in presence of finely divided metals. 15,560 and 15,561. H. L. R. Lunden and C. T. Thorsaels.
 Rubber, treatment of. 15,530. S. C. Davidson.
 Rubber, vulcanization of. 15,479. J. F. Reid.
 Soap, manufacture of. 15,307. A. Samoiloff.

Complete Specifications

- 127,309. VOLATILE BODIES SUCH AS ETHER, ALCOHOL, &C., FROM GAS MIXTURES, PROCESS FOR RECOVERING. A. Daniel and J. H. Biegeat, 6, Rue St. Georges, Paris.

The use of phenol and its homologues with other bodies, for the continuous recovery, by means of suitable apparatus, of one or more of the volatile bodies ether, alcohol, or acetone contained in gaseous mixtures.

- 127,312. VALVE FOR COMPRESSED AIR, &C. East Rand Proprietary Mines Quarters, and G. D. Hook, Transvaal. *See illustration.*

A retaining valve (B, C) which by means of a hollow adjusting screw (E) is converted into a valve automatically operated by fluid or air-pressure in such a manner that the valve controls the passage of the fluid, so that a full flow cannot pass through until the pressure upon the discharge side has risen to approximately that upon the retaining side of the valve, when the valve is further opened by means of a spring (L).

Also a valve having the features claimed above, but which has no spindle projecting through the casing to the outside, thus preventing leakage.

- 127,343. NITRIC ACID FROM AMMONIA. E. B. Maxted, 63, Highgate Road, Walsall.

In the manufacture of concentrated nitric acid or nitrogen peroxide by the oxidation of ammonia, the fractional condensation of the products of oxidation in two or more stages carried out at decreasing temperatures, the first stage being effected at a temperature of from 50–100 deg. C. and the second, together with the successive stages, being effected at temperatures below 0 deg. C.

- 127,363. GASES FROM OIL OR WATER, IMPROVEMENTS IN PRODUCTION OF. E. C. R. Marks, 57, Lincoln's Inn Fields, W.C. 2.

A process for the continuous and regular production of gases in which heavy or light oils or tar are injected into a gas producer of the kind in which the ashes of the solid fuel employed therein

are fused, the heavy or light oils or tar being introduced into the producer through nozzles which are arranged in one or more rows above the dry air nozzles.

Also a process for the continuous and regular production of gases from water or oil.

- 127,398. SULPHATE OF AMMONIA, IMPROVEMENTS IN MANUFACTURE OF. N. Wilton, 100, Station Road, Hendon, N.W. 4. *See illustration.*

A process for the production of neutral sulphate of ammonia. In the figure, A is the saturator from which the salt is passed to a centrifugal dryer, B.

In operation ammonium sulphate—for example, washings or drainings from an ammonium sulphate plant—is introduced into the ammonia generator C, together with powdered lime, and the mixture is heated, whereby pure ammonia is generated, which, after passing through the condenser mounted on the top of the vessel C, is introduced into water in the earthenware vessels D. Thus a 10 to 15 per cent. pure ammonia liquor is produced. Into the tank E is introduced also a quantity of ammonium sulphate solution, for example, cold mother liquor from the saturator, or a solution made by dissolving some of the acid ammonium sulphate in water. The pure ammonia liquid formed in the vessels D is then introduced into the tank E, so as to render the liquor therein alkaline to the required degree. This cold alkaline liquor is pumped or forced up into the supply tank F. After a charge of acid ammonium sulphate from the vessel A has been dried in the centrifugal machine B, a quantity of cold alkaline saturated sulphate solution from the supply tank F is run into the centrifugal machine through the pipe H and the rubber hose J. The alkaline sulphate neutralises the acid in the charge, whereby a neutral ammonium sulphate is produced, which is practically dried in the centrifugal machine, and may be then stored or packed in bags or other containers for transport.

- 123,302. GLYCERINE, APPARATUS FOR DISTILLING. Société Française des Glycerines, Paris. *See illustration.*

The apparatus consists of a sheet metal cylinder A containing the glycerine, and in the interior of the cylinder a second concentric cylinder B is mounted in which the atomising takes place. In the cylinder A, the glycerine is heated by a coil and raised to a temperature of 180 deg. C. The cylinder is fed in a continuous manner by a vacuum suction, and a constant level is maintained owing to the provision of a float cock, C. The vacuum in the cylinder A is maintained in the vicinity of 64cm. of mercury.

The cylinder A is in communication with a water condenser by means of a pipe D, whereby any impurities volatilised below 180 deg. C. can escape into the said condenser. The vacuum is regulated to the desired value by means of a valve E arranged on the pipe D. The cylinder A is further provided with a vacuum gauge L, a drain cock F and a pipe G terminating in a rose and conveying the glycerine to the atomisers H. The cylinder B, or atomising chamber, has a drain cock I connected to a collector drum for the residue which is produced as the distillation proceeds, and must be discharged without having to stop the apparatus.

The cylinder B communicates at the top, through a pipe S, with a series of condensers, and is also provided with a vacuum gauge K. The pipe S is in communication with the upper end of the pipe G, not directly, but through a safety valve loaded to open at a pressure of about 2.2kg. per sq. cm., which valve is not shown in the drawing. This valve is arranged so as to allow hot glycerine or vapour to be impelled into the pipe S should any excess pressure develop in the vessel A, say by leakage from the heating coils. In normal working, of course, the valve completely closes the top end of the tube G. The vacuum in B is kept at about 72cm. of mercury, that is, somewhat higher than in A, so that the glycerine will readily pass from the vessel

A to the vessel B. The contents of the latter are maintained at about 180 deg. C. by means of a heating worm or coil.

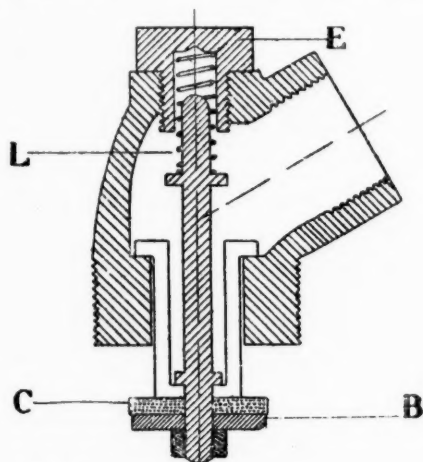
The atomisers H, to the number of three, are arranged at the apices of an equilateral triangle inscribed in a circumference described from the centre of the apparatus with a radius equal to two-thirds of that of the atomising chamber. The atomisers are vertical and their jets are directed downwards. They are fed with expanded steam superheated to 180 deg. C.

The supply of glycerine to the atomising vessel through the pipe G is assisted by the injection of steam through a pipe M

leading to the atomisers, and is regulated by adjustment of the difference of vacuum between A and B.

127,431. COAL GAS PURIFICATION, IMPROVEMENTS IN. W. G. Adam, 1, Park Row, S.W. 1.

Coal gas, preferably after having been passed through the usual purifiers and scrubbers, is passed through animal or wood charcoal, preferably in a granulated condition. By this process carbon disulphide, carbon oxysulphide, thiophene, naphthalene, and other impurities are removed from the gas, and benzene



127,312.

FIG. 1.

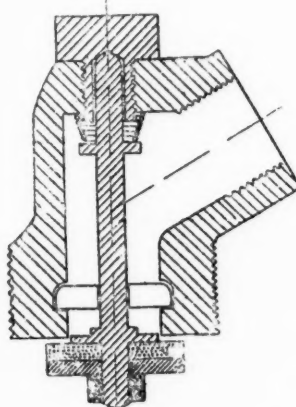
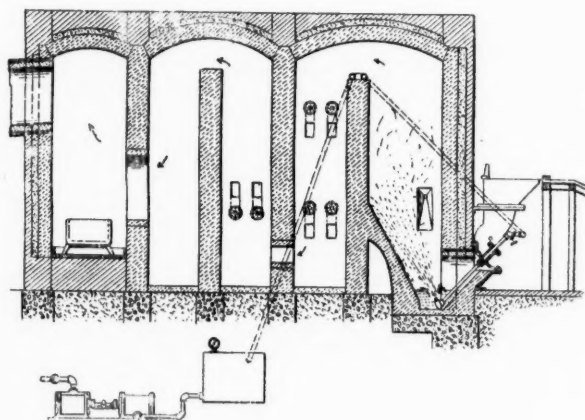


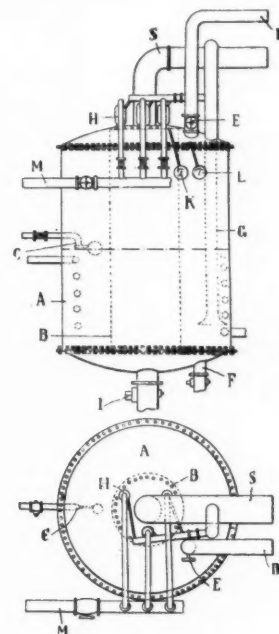
FIG. 2.



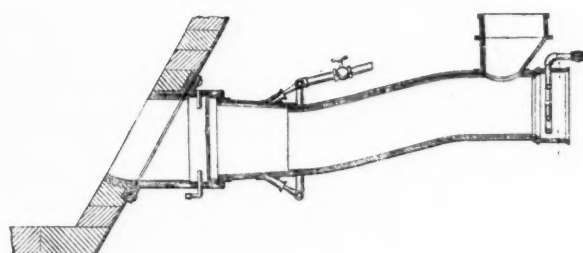
118,097.



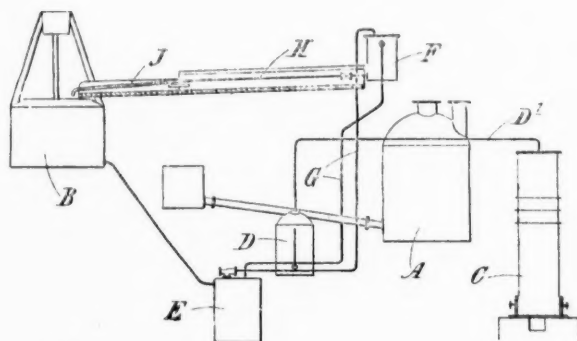
127,534.



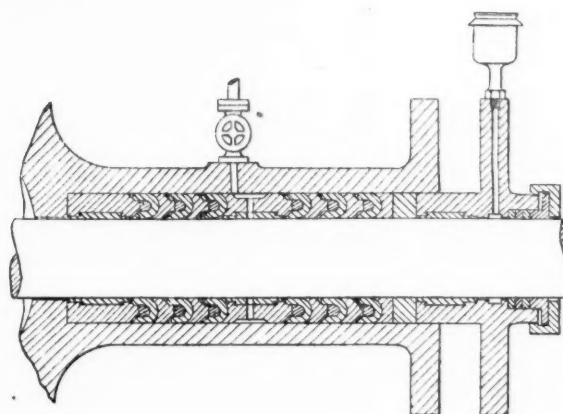
123,302.



127,547.



127,398.



127,521.

and toluene are also removed if their removal has not already been effected.

The sulphur and other compounds may be recovered from the charcoal in an unchanged condition by the application of heat. 118,097. IMPROVEMENTS IN SULPHUR BURNING. Pratt Engineering and Machine Co., U.S.A. See illustration.

The general objects of the improvement are to afford increased efficiency as compared with heretofore known processes and apparatus, and improvements in output and economy when made use of for sulphuric acid manufacture or other practical purposes. Other general objects of the invention are the simplification, reduction in size and cheapening of the apparatus, rendering more simple, convenient and effective its observation and handling, and increasing its life and durability.

127,478. EXTRACTION OF OIL FROM COTTON SEED. C. O. Phillips, Chappaqua, Westchester County, U.S.A.

A method of improving the extracting of oil from cotton seed meats which comprises cooking the crushed meats in intimate admixture with a small amount of a dilute alkali carbonate solution, such as a solution of sodium carbonate or bicarbonate, and expressing the oil from the cooked meats.

127,521. PACKING FOR RODS OF GAS AND AIR COMPRESSORS. E. A. Thomson, 45, Stanhope Avenue, Finchley. See illustration.

Packing for the rods of ammonia, gas and air compressors, pumps and fluid pressure engines, comprising a cupped ring or a series of cupped rings having in the recess of each ring an elastic expansion ring supported by a distance ring or bearing piece, characterised in that each cupped ring is formed with bevelled edges and the corresponding bearing ring is provided with inclined surfaces bearing on edges.

127,534. PYROMETERS. J. E. P. Kievits, 46, Francis Road, Lozells, Birmingham, and Kynoch, Ltd. See illustration.

A protective sheath, for thermo-couples, made of non-corrosive alloy reduced in thickness at the end and in close contact with the couple to give rapid readings.

127,547. APPARATUS FOR BURNING POWDERED FUEL. E. C. Marks, 57, Lincoln's Inn Fields, W.C.2. See illustration.

Apparatus for introducing powdered fuel into the fire-box of a furnace, which comprises a fuel-carrying conduit having a section of larger diameter contiguous to the inlet to the fire-box for the purpose of reducing the velocity of, and diffusing the fuel carrying medium, said enlarged section having a plurality of lateral inlets for admitting atmospheric air.

Scientific Research at Hadfield's

IN addition to the particulars published in our last issue respecting scientific research at Hadfield's, Ltd., the following notes are supplied by a correspondent:—

At the Hadfield works at Sheffield no fewer than 3,000 different alloy steels made specially have been examined and tested to date. Their tests have been recorded—that is, in an experimental way—apart altogether from routine testing and investigation of the firm's processes. A thorough examination is also made of the refractories used in the various furnaces and other plant, which are an important item in steel manufacture. On this department falls the responsibility for and care of the pyrometers used in the works, for which a special laboratory and scientific staff is provided. These instruments, which have become indispensable for the proper control of the temperature in heat treatment operations, require special care in order to ensure their giving reliable indications, and the extent of their use may be gathered from the fact that no fewer than 12,000 pyrometric observations are made per week. Help is also given by the Hadfield Research Laboratory to customers in solving their own special problems, and in advice as to the most suitable type of steel to use for certain purposes, or the modifications of the conditions of use so as to employ the qualities of the steel to the best advantage.

While a large proportion of the research work is devoted to improvement of the firm's products, much metallurgical

research of a less immediately utilitarian nature—that is, what might be called research in pure science—has been carried out. The results of the researches have been published by Sir Robert Hadfield in various papers to the Scientific Societies and other literature, now amounting to some 300 in number. Among the many special steels and steel products resulting from the Hadfield research work and investigation are the following:—

"Era" Manganese Steel, discovered by Sir Robert Hadfield in 1882, and now extensively used for the wearing parts of crushing machinery, points and crossings, &c.

Hadfield's Low-Hysteresis Steel, invented by Sir Robert Hadfield, and now used very extensively throughout the world under various trade-mark names in transformers, dynamos and other electrical apparatus. This material enables a saving of energy to the value of tens of millions of pounds annually.

"Resista" Steel, for helmets, body-shields and bullet-proof plates. A recent application of this steel is for spades and shovels.

"Heclon" and "Eron" armour piercing and other projectiles of all calibres.

"Hadura" steel rolls, for cold rolling steel and other hard metals. These rolls, accurately ground and highly polished on the body, are supplied by Hadfield's, Ltd., ready for use. Before the war such rolls were obtained from abroad, but now all requirements are met satisfactorily by Hadfield's with home-made products of the highest possible quality.

Hadfield's "Era" non-magnetic steel for balkheads on warships, trawler wheel-houses, and other structures placed near the mariner's compass, to ensure good compass action.

Hadfield's high permeability dynamo steel.

Hadfield's "Hecla Mt. 80" and "Hecla Mt. 63" steels for permanent magnets.

"Hecla N.K." steel, for airplanes, motor cars, &c.

"Galahad" non-corrosive steel, for cutlery and other purposes.

Lever Brothers' Capital Increased

RESOLUTIONS authorising an increase of the capital of Lever Brothers, Ltd., to £100,000,000, by the creation of several classes of new shares, were passed at an extraordinary general meeting of the shareholders last week at Port Sunlight. The Hon. Hume Lever, who presided, explained that although an increase of capital had been authorised last February, that capital required strengthening and supporting by further issues as opportunity offered. They constantly required to issue capital for purchasing new businesses, and it was felt for all such purposes it would be wise to create the capital they asked the shareholders to authorise. The effect of this would be that they would further strengthen the position of existing Preferential shareholders, as they purchased new businesses. Their capital had always been issued in series, and following this policy it was now proposed to create various series of capital which could be created now, but which it might not be possible to create later on, the directors felt, although they were looking a very long way ahead, they were acting in the best interests of business in taking advantage of the present opportunity to insure to the company in future ample supplies of unissued capital for extension and development of existing business, and for acquisition of further enterprises. The result would be greater security to existing Preference shareholders, better and more efficient service to the public, ability to sell products at the lowest world's price of production, and on such lines to secure a solid and progressive character of the business on the sound basis of finance. It was also resolved that each of the 10,000,000 20 per Cent. Cumulative Preferred Shares, of which 750,000 were issued and fully paid up, being sub-divided into four 5s. Shares, be credited as fully paid up.

SIALANG RUBBER ESTATES.—The report for the year to January 31 states that the net profit amounted to £29,101, against £84,806; unappropriated profit from 1917-18, £52,009, against £45,795, less excess profits duty for the year to January 31, 1918, £41,455. The directors recommend a dividend of 12½ per cent., less tax at 5s. 10d. in the £ (against 16 per cent. for the whole of the previous year); to place £5,000 to development reserve account, the same; and to carry forward £9,545 (subject to Ned-Indies War Profits Tax, if any, and a refund of Excess Profits Duty).

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. Only commodities whose values are at the time of particular interest or of a fluctuating nature are included in our weekly report. A more complete list and report, including a Continental and American report, appears in the first issue of each month, and will include prices of plant supplies, building materials, structural steel, fuels, glues, ores, refractories, metals, minerals, and miscellaneous materials, as soon as the necessary arrangements are completed. The present report contains some of these items. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report. Suggestions and criticisms in regard to these pages will be welcomed.

Market Report

THURSDAY, July 3, 1919.

THE market this week has been quietly steady, and there does not appear to be any great expansion in demand for the home trade. Considering, however, that this is stock-taking period for many firms, the volume of business cannot be described as very unsatisfactory.

The undertone of the market is quite firm and several advances in prices have been noticed.

A fair volume of export business has been transacted, but the Exchange question is having a retarding effect on transactions in some markets.

General Chemicals

ACID ACETIC.—Manufacturers are fully occupied for July, and maintain their present quotations for Aug.-Sept. shipment. Freight from U.S.A. being higher again, prices of Acetic will have to be raised.

ACID BORACIC.—Large quantities have lately been delivered for export and spot parcels are difficult to obtain except at a premium.

ACID CARBOLIC.—It is authoritatively stated that large quantities of American war-time stock have been absorbed, and that appreciably higher prices are being offered for white crystal. English makers are heavily engaged and are already realizing 1d-1½d. per lb. above last week's quotations.

ACID FORMIC.—The present high price considerably restricts consumption. We believe that this product will be much cheaper later in the year.

ACID OXALIC.—Consumption is gradually increasing again and a steady business is passing at present quotations.

ACID SALICYLIC.—In consequence of the improvement in the position of Carbolic, the English and American manufacturers have been obliged to notify advances in prices.

ACID SULPHURIC.—Quantities of 92-93 per cent. monohydrate are available from stocks at various points in the kingdom at low prices.

AMMONIUM CHLORIDE.—The price has been reduced for this material.

BARIUM SALTS.—There has been a little more inquiry for Barium Products, but there are no changes in value.

BLEACHING POWDER.—Industrial requirements at home are not needing their usual portion of the production, though export business continues to improve steadily.

CHROME ALUM.—This product is now being manufactured on a small scale in England.

CREAM OF TARTAR.—The cheap second-hand parcels are being bought up and the position is rapidly recovering.

COPPER SULPHATE.—There is no change in the position and the market is extremely quiet for export, with a steady demand for home trade.

FORMALDEHYDE.—New works are being erected in England, and competition between this country and America is expected to be livelier before long.

MAGNESIUM SULPHATE (EPSOM SALTS).—Trade is stagnant in this article, with a keen competition for the few export orders passing.

POTASSIUM BICHROMATE.—There is more enquiry for export. Cheap second-hand parcels occasionally make their appearance and are quickly appropriated.

POTASSIUM CARBONATE.—Until the principal buyers know something definite of the Government's intentions regarding the importation of German and Austrian supplies, they will not place large contracts.

POTASSIUM PERMANGANATE.—The future of this salt is very uncertain. Consignments received from Japan are practically cleared and buyers have to rely upon English make for a time.

SODIUM ACETATE.—Export demand is better and when the Textile Trade improves there will be more call for it.

SODA, CAUSTIC.—Export business remains good, but until the home industries are much busier, the market will remain quiet.

Heavy Coal Tar Products

There are signs of greater activity in the market, and though no great business has yet resulted there is more enquiry for many of the products.

BENZOL remains unchanged at 1s. 9d. to 1s. 10d. per gallon, free-on-board.

CREOSOTE.—With less demand for Admiralty purposes there is less activity, but there are no quotations at under 5d. per gallon at Works.

CRESYLIC ACID remains quiet at 2s. 6d. per gallon for dark, 95 per cent. and 2s. 7½d. to 2s. 9d. per gallon for 97-99 per cent., f.o.b. in barrels.

NAPHTHALENE is irregular, and as low as £13 per ton has been accepted for the refined quality, but there is still a good demand for Crude at between £5 and £10 per ton according to quality.

SOLVENT NAPHTHA is quiet at 1s. 9d. to 2s. in the North and 2s. to 2s. 3d. in London.

PITCH.—There is some demand for next season's deliveries at the last quotations.

Sulphate of Ammonia

There is still a fair demand for export, and the controlled prices are unchanged.

Coal Tar Intermediates

Since our last issue there are practically no changes to be recorded in the prices of Coal Tar Intermediate products. The demand steadily continues without developing sufficient activity to affect the market.

ANILINE OIL.—There seems to be much more enquiry for export, and several important orders have been recently taken. In view of the fact that the large stocks of surplus oil have been practically cleared, the production is becoming more normal, and it is improbable that any reduction in price is likely to take place in the near future.

ANTHRANILIC ACID.—Although this product is being offered more freely from the States, the present high prices, however, preclude all prospects of its being employed commercially in the dyemaking industry.

BETANAPHTHOL.—The makers are rather inclined to take any large orders, at a slight modification in price.

METANILIC ACID.—It may be of general interest to colour-makers to know that this product is now obtainable from American sources in limited quantities.

ORTHOAMIDOPHENOL BASE is now obtainable from English manufacturers of excellent quality, and an active demand in the near future is to be anticipated.

TECHNICAL RESORCIN.—The new make to which we referred

in a recent issue has created a certain amount of interest owing to its exceptionally fine quality and a certain amount of business has been taken.

Prices since the last issue entirely unchanged.

Current Prices

Chemicals.		July 3, 1919.	
	per	£ s. d.	£ s. d.
Acetic anhydride	lb.	0 3 6	to 0 3 9
Acetone oil	ton	77 10 0	to 82 10 0
Acetone, pure	ton	95 0 0	to 97 0 0
Acid, Acetic, Glacial, 99-100%	ton	77 10 0	to 80 0 0
Acetic, 80% pure	ton	62 10 0	to 65 0 0
Arsenic	ton	50 0 0	to 52 0 0
Boric, cryst.	ton	72 0 0	to 73 0 0
Carbolic, crys. 39-40%	lb.	0 0 5½	to 0 0 6
Citric	lb.	0 4 4	to 0 4 5
Formic, 90%	ton	—	—
Gallic, pure	lb.	0 6 0	to 0 6 3
Hydrofluoric	lb.	0 0 7	to 0 0 8
Lactic, 50 vol.	ton	70 0 0	to 72 10 0
Lactic, 60 vol.	ton	85 0 0	to 87 10 0
Nitric, 80 Tw.	ton	31 0 0	to 33 0 0
Oxalic	lb.	0 1 3	to 0 1 2½
Phosphoric, 1.5	ton	50 0 0	to 60 0 0
Pyrogallic, cryst.	lb.	0 10 3	to 0 10 6
Salicylic, Technical	lb.	0 1 4	to 0 1 6
Salicylic, B.P.	lb.	0 1 9	to 0 1 10
Sulphuric, 92-93%	ton	7 10 0	to 8 0 0
Tannic, commercial	lb.	0 2 9	to 0 3 0
Tartaric	lb.	0 3 3	to 0 3 4
Alum, lump	ton	17 10 0	to 17 15 0
Alum, chrome	ton	97 0 0	to 99 0 0
Aluminium, sulphate, 14-15%	ton	13 10 0	to 14 0 1
Aluminium, sulphate, 17-18%	ton	17 0 0	to 17 10 0
Ammonia, anhydrous	lb.	0 1 8	to 0 2 0
Ammonia, .880.	ton	32 10 0	to 37 10 0
Ammonia, .920.	ton	20 0 0	to 24 0 0
Ammonia, carbonate	lb.	0 0 6½	to —
Ammonia, chloride	ton	60 0 0	to 65 0 0
Ammonia, muriate (galvanisers)	—	48 0 0	to 50 0 0
Ammonia, nitrate	ton	55 0 0	to 57 10 0
Ammonia, phosphate	ton	115 0 0	to 120 0 0
Ammonia, phosphocyanide	lb.	0 2 0	to 0 2 2
Amyl, acetate	ton	215 0 0	to 220 0 0
Arsenic, white, powdered	ton	38 0 0	to 39 0 0
Barium, carbonate	ton	11 0 0	to 12 0 0
Barium, carbonate, 92-94%	ton	11 0 0	to 12 0 0
Chloride	ton	27 0 0	to 27 10 0
Nitrate	ton	51 0 0	to 52 0 0
Sulphate, blanc fixe, dry	ton	25 10 0	to 26 0 0
blanc fixe, pulp	ton	15 10 0	to 16 0 0
Bleaching powder, 35-37%	ton	13 10 0	to 14 0 0
Borax crystals	ton	44 0 0	to 45 0 0
Calcium acetate, grey	ton	16 0 0	to 16 10 0
Carbide	ton	28 0 0	to 30 0 0
Chloride	ton	8 10 0	to 9 0 0
Carbon bisulphide	ton	53 0 0	to 54 0 0
Cerium oxalate	lb.	0 3 9	to 0 4 0
Cobalt acetate	lb.	0 7 0	to 0 7 6
Oxide	lb.	0 7 9	to 0 8 0
Copper chloride	—	—	—
Sulphate	ton	45 0 0	to 46 0 0
Cream of tartar, 98-100%	ton	230 0 0	to 235 0 0
Epsom salts (see Magnesium sulphate)	—	—	—
Formaldehyde	ton	122 10 0	to 125 0 0
Formusol (Rongalite)	lb.	0 4 0	to 0 4 3
Glauber salts	ton	3 0 0	to 3 5 0
Hydrogen peroxide, 12 vols.	gal.	0 2 8	to 0 2 9
Iron perchloride	ton	32 0 0	to 34 0 0
Iron sulphate (Copperas)	ton	4 15 0	to 4 17 6
Lead acetate, white	ton	82 10 0	to 85 0 0
Lead nitrate	ton	58 0 0	to 59 0 0
Litharge	—	—	—
Lithophone, 30%	ton	42 0 0	to 40 0 0
Magnesium chloride	ton	15 0 0	to 16 0 0
Carbonate, light	cwt.	3 0 0	to 3 5 0
Sulphate (Epsom salts commercial)	—	11 10 0	to 12 10 0
Sulphate (Druggists')	—	17 0 0	to 18 0 0
Methyl acetone	ton	89 0 0	to 90 0 0
Alcohol, 0.1% acetone	gall.	0 9 0	to 0 9 6
Nickel ammonium sulphate, single salt	ton	47 10 0	to 52 10 0
Potassium bichromate	lb.	0 1 6	to 0 1 7
Carbonate, 90%	ton	90 0 0	to 92 10 0
Chloride	per ton	£ s. d.	£ s. d.
Chlorate	lb.	0 1 2	to 0 1 3
Meta-bisulphate, 50-52%	ton	200 0 0	to 205 0 0
Nitrate refined	ton	58 0 0	to 60 0 0
Permanganate	lb.	0 3 6	to 0 3 9
Prussiate red	lb.	0 6 0	to 0 6 3
Prussiate, yellow	lb.	0 1 9	to 0 1 10
Salammoniac, firsts	cwt.	4 0 0	—
Seconds	cwt.	3 15 0	—
Sodium acetate	ton	55 0 0	to 57 0 0
Arsenate, 45%	ton	47 0 0	to 47 10 0
Bicarbonate	ton	9 0 0	to 9 10 0
Bichromate	lb.	0 0 8	to 0 0 8½
Bisulphate, 50-62%	ton	29 0 0	to 30 0 0
Chlorate	lb.	0 0 8	to 0 0 8½
Caustic, 70%	ton	19 0 0	to 19 10 0
Caustic, 76%	ton	23 0 0	to 23 10 0
Hydrosulphite, powder, 85%	lb.	0 3 3	to 0 3 6
Hyposulphite, commercial	ton	17 0 0	to 17 10 0
Nitrite, 96-98%	ton	58 10 0	to 60 0 0
Phosphate, crystal	ton	25 0 0	to 25 10 0
Perborate	lb.	0 2 2	to 0 2 4
Prussiate	lb.	0 0 7½	to 0 0 8
Sulphide, crystals	ton	15 10 0	to 16 0 0
Sulphide, solid, 60-62%	ton	22 0 0	to 24 0 0
Sulphite, crys.	ton	11 0 0	to 11 10 0
Strontium carbonate	ton	85 0 0	to 90 0 0
Nitrate	ton	85 0 0	to 90 0 0
Sulphate	ton	8 0 0	to 10 0 0
Sulphur chloride	ton	38 0 0	to 40 0 0
Flowers	ton	22 0 0	to 24 0 0
Roll	ton	21 0 0	to 23 0 0
Tin perchloride, solution	—	0 1 6	to 0 1 9
Perchloride, solid	lb.	0 3 3	to 0 3 6
Protocloride, crystals	lb.	0 1 8	to 0 1 9
Zinc chloride, 102 Tw.	ton	22 0 0	to 23 10 0
Chloride, solid, 96-98%	ton	60 0 0	to 65 0 0
Oxide, 99%	ton	80 0 0	to 85 0 0
Oxide, 94-95%	ton	60 0 0	to 62 10 0
Dust, 90%	ton	70 0 0	to 72 10 0
Sulphate, 99%	tn	21 10 0	to 23 0 0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0 3 0	to 0 3 6
Alphanaphthol, refined	lb.	0 3 6	to 0 3 9
Alphanaphthylamine	lb.	0 2 6	to 0 2 9
Aniline oil, drums free	lb.	0 1 2	to 0 1 3
Azine salts	lb.	0 1 3½	to 0 1 4
Anthracene, 80%	lb.	0 2 6	to 0 2 9
Benzaldehyde (free of chlorine)	lb.	0 9 0	to 0 9 6
Benzidine, base	lb.	0 5 6	to 0 6 0
Benzidine, sulphate	lb.	0 4 9	to 0 5 0
Benzoic acid	lb.	—	—
Benzoate of soda	lb.	—	—
Benzyl chloride, technical	lb.	0 1 9	to 0 2 0
Betanaphthol ben oate	lb.	1 5 0	to 1 7 6
Betanaphthol	lb.	0 2 3	to 0 2 6
Betanaphthylamine technical	lb.	0 6 6	to 0 7 0
Dichlorobenzol	lb.	0 0 5	to 0 0 6
Diethylaniline	lb.	0 7 0	to 0 8 0
Dinitrobenzol	lb.	0 1 4	to 0 1 6
Dinitrochlorbenzol	lb.	0 1 2	to 0 1 3
Dinitronaphthalene	lb.	0 2 0	to 0 2 3
Dinitrotoluol	lb.	0 1 10	to 0 2 0
Dinitrophenol	lb.	0 1 10	to 0 2 0
Dimethylaniline	lb.	0 2 9	to 0 3 0
Diphenylamine	lb.	0 3 0	to 0 3 3
H-Acid	lb.	0 7 6	to 0 8 0
Metaphenylethylenediamine	lb.	0 4 6	to 0 4 9
Monochlorobenzol	lb.	0 0 9	to 0 0 10
Naphthionic acid, crude	lb.	0 3 6	to 0 3 9
Naphthylamin-di-sulphonic acid	lb.	0 4 6	to 0 5 0
Nitronaphthalene	lb.	0 1 2	to 0 1 6
Nitrotoluol	lb.	0 1 3	to 0 1 6
Orthoamidophenol	lb.	0 18 0	to 1 0 0
Orthodichlorobenzol	lb.	0 1 1	to 0 1 3
Orthotoluidine	lb.	0 2 0	to 0 2 3
Orthonitrotoluol	lb.	0 1 6	to 0 1 9
Para-amidophenol, base	lb.	0 14 0	to 0 15 0
Para-amidophenol, hcl.	lb.	0 15 6	to 0 16 0
Paradichlorobenzol	lb.	0 0 4	to 0 0 5
Paranitraniline	lb.	0 4 0	to 0 4 6
Paranitrotoluol	lb.	0 5 3	to 0 5 6
Paraphenylenediamine, distilled	lb.	0 15 0	to 0 16 0
Paratoluidine	lb.	0 7 0	to 0 7 6
Phthalic anhydride	lb.	0 14 0	to 0 15 0
Resorcin, technical	lb.	0 15 0	to 0 16 0

	per	£	s.	d.	£	s.	d.
Resorcin, pure	lb.	—	—	—	—	—	—
Salicylic acid	lb.	—	—	—	—	—	—
Salol	lb.	—	—	—	—	—	—
Sulphanilic acid, crude	lb.	0	1	0	0	1	3
Toluidine, base	lb.	0	9	0	0	10	0
Toluidine, mixture	lb.	0	2	9	0	3	0

Miscellaneous and Paint Materials

Barytes	ton	13	0	0	to	15	0	0
Casein	ton	80	0	0	to	85	0	0
Chalk, precipitated (light)	ton	20	0	0	to	24	0	0
Chalk, precipitated (heavy)	ton	10	0	0	to	12	0	0
China clay (bags extra) (f.o.r. Corn-wall)	ton	1	12	6	to	3	12	6
Coke (blast furnace)	ton	1	19	0	to	2	2	0
Coke (foundry)	ton	2	4	0	to	2	16	0
Fuller's Earth	ton	4	0	0	to	5	0	0
Lead, litharge flake	ton	45	0	0	to	—	—	—
Lead, red	cwt.	2	2	6	to	2	7	6
Lead, white	cwt.	2	10	0	to	2	15	0
Ultramarine	ton	80	0	0	to	100	0	0
Prussian Blue	cwt.	11	0	0	to	11	10	0
Chrome green	cwt.	6	5	0	to	6	10	0
Chrome yellow	cwt.	6	5	0	to	7	0	0
Mineral black	ton	8	0	0	to	10	0	0
Carbon black	lb.	0	1	3	to	0	1	6
Guignet's Green, 30%	lb.	0	1	5	to	—	—	—

Metals and Ferro-Alloys

Aluminium, 98-99%	ton	150	0	0	to	150	0	0
Antimony (English)	ton	45	0	0	to	45	0	0
Copper, best selected	ton	90	0	0	to	92	0	0
Ferro-chrome, 60%	ton	50	0	0	to	55	0	0
Ferro-manganese, 76-80%	ton	25	0	0	to	25	10	0
Ferro-silicon, 45-50%	ton	23	0	0	to	23	10	0
Ferro-tungsten, 75-80%	lb.	0	2	11	to	0	3	0
Lead (ingot)	ton	22	5	0	to	23	5	0
Lead (sheet)	ton	35	0	0	to	35	0	0
Nickel, 98-99%	ton	195	0	0	to	196	0	0
Tin	ton	238	0	0	to	240	0	0
Zinc (spelter)	ton	39	0	0	to	39	0	0

Structural Steel

Angles, tees and flats	ton	17	0	0	to	17	15	0
Joists	ton	17	5	0	to	18	5	0
Plates	ton	17	15	0	to	18	5	0
Rails, heavy	ton	16	0	0	to	16	5	0
Sheets, 24 G. black	ton	22	0	0	to	23	0	0
Sheets, galvanised corrugated	ton	32	10	0	to	33	10	0

Building Materials

Bricks, stock	1000	3	16	0	to	3	18	0
Bricks, blue Staffs.	1000	8	0	0	to	8	10	0
Firebricks, Stourbridge	1000	9	0	0	to	9	10	0
Lime	ton	2	14	0	to	2	18	0
Portland cement	ton	3	10	0	to	3	14	0
Slates, Bangor	1200	20	0	0	to	40	0	0
Tiles	1000	6	0	0	to	6	10	0
Yellow Pine up to 3×8	standard	45	0	0	to	55	0	0
Yellow pine over 3×8	standard	50	0	0	to	60	0	0
Linseed oil, boiled	gall.	0	11	0	to	0	11	6
Linseed oil, raw	gall.	0	10	6	to	0	11	0
Turpentine	gall.	0	9	0	to	0	9	6

Chemical Matters in Parliament**Ministry of Commerce**

In reply to questions put by Rear-Admiral Adair and Major Sir Keith Frazer, with regard to the establishment of the Ministry of Commerce, Mr. Bonar Law stated in the House of Commons, on Monday, that it is intended that the Board of Trade shall be developed to perform all the functions of a Ministry of Commerce. Further questioned by Captain Ormsby-Gore as to whether the Overseas Trade Department would be put entirely under the Board of Trade and altogether separated from the Foreign Office, Mr. Bonar Law replied that a committee was at present considering that question, and he hoped the report would be made almost immediately.

British Cellulose Company

In the House of Commons on Tuesday, Mr. Bonar Law stated that he hoped the Report of Lord Sumner's Committee regarding the British Cellulose & Chemical Manufacturing Company would be ready before the end of this month.

Sulphuric Acid

In reply to Sir R. Cooper, Sir Eric Geddes stated that in 1918 the quantity of sulphuric acid consumed in the United Kingdom was, according to information placed at his disposal by the Ministry of Munitions, about 1,290,000 tons (100 per cent. acid), including about 310,000 tons of fuming acid. The corresponding quantity for 1913, so far as could be estimated, was 1,000,000 tons, the fuming acid included being about 25,000 tons. In both cases the figures referred to acid freshly manufactured in the year.

Foreign Commercial Travellers in British Markets

In reply to Sir Harry Brittain, who asked the Home Secretary (1) whether, in view of the probable influx of commercial travellers from foreign countries for the exploitation of competing foreign goods in British markets following upon the declaration of Peace, His Majesty's Government would consider the propriety of instituting a system of licences for such foreign travellers, representatives, and agents, with appropriate differentiation between nationals of Allies, neutrals, and countries which had recently been at war with Great Britain; (2) whether he would consider the desirability of bringing into operation a register of all persons entering the ports of the United Kingdom who are engaged in the exploitation of foreign trade in this country, such register to indicate the nationality of the business man, commercial traveller, or agent, as the case might be, the nature of the industry in the interest of which his or her visits to this country are made, and the particular areas in the United Kingdom in which business operations are contemplated; and whether daily or weekly extracts from the register could be circulated to the Press and supplied to Chambers of Commerce and other business organisations, Mr. Shortt stated that he was not prepared to adopt the suggestions. Adequate steps are being taken under the Aliens Restriction Order to exclude any aliens who cannot produce satisfactory reasons for entering this country. The hon. Member's proposal would require a great deal of complicated Government machinery, and he was not satisfied that they were either necessary or calculated to assist British trade.

Sir H. Brittain:—Will the right hon. gentleman consider the registration of foreign commercial travellers, with the necessary details of the firms they represent?

Mr. Shortt:—That will be considered.

The Bleachers' Association

PRESIDING at the annual meeting of the Bleachers' Association, Ltd., Sir Alan Sykes said he had no doubt that the common sense of the nation would assert itself, and that employers and employed would come to reasonable agreements which would enable trade to be resumed upon a mutually satisfactory basis. That association had maintained satisfactory relations with its workpeople but he trusted that the workers would recognise that they could only pay better wages by a high rate of production being maintained. This, he thought, was fully recognised by Trade Union leaders. Regarding the production of dyestuffs, the merger of British Dyes and Levinsteins had now been carried through. That combination had the great good fortune of securing Lord Moulton as chairman, which was a happy augury for the success of the undertaking and a guarantee that nothing would be left undone to hasten the establishment of this vitally essential industry in Great Britain.

Respecting the outlook, they had weathered the war conditions better than might have been hoped and were in a position to resume normal trading as soon as world conditions settled themselves, but they could not close their eyes to the fact that the next year or two would be difficult ones. Under increased expenditure upon wages and materials they could see no chance of inducing extra trade by making any concessions in price to customers. The extra cost of coal now foreshadowed meant an additional annual charge upon the association's business of about £100,000. Still, at present they saw signs of increased trade, especially Eastern, and, given normal conditions, they were in a position to take advantage thereof.

Company News

ALUMINIUM CORPORATION.—Presiding at the ninth ordinary general meeting of the Aluminium Corporation, Ltd., on Monday, Mr. A. F. Bott said in the absence of accounts the proceedings would be only formal, in order to comply with the Companies Act, and to enable them to declare a preference dividend of 7 per cent. for the year 1918. This he proposed, and Mr. R. Taylor seconded, the motion being carried unanimously. The meeting was adjourned until such time as the board were in a position to submit the accounts.

ANGLO-AMERICAN OIL.—The report to Dec. 31 last states that the profit production of crude oil amounted to 277,300 tons, as compared with 134,500 tons in 1917. Towards the end of 1918 it was found that the profits resulting from the increased output of the fields warranted the payment of the arrears of interest on the income bonds which form a first charge upon the profits. The total interest accrued to November 1, 1918, amounted to £76,352, and this was paid. In April this year the position had improved to such an extent that the directors decided to pay off the arrears of the 6 per cent. dividend on the preference shares, amounting to £56,229; and to distribute an interim dividend on the whole of the ordinary shares—the amount on the P shares being at the rate of 15 per cent. per annum, and the others in their due proportion. The profits for the year amounted to £654,415. The directors recommend that final dividends be paid on the respective classes of shares. Upon the B shares this amounts to a further dividend at the rate of 10 per cent. per annum, making a total of 25 per cent. for 1918 upon the ordinary B shares.

ASTRA ENAMELLING CO.—Mr. Justice P. O. Lawrence on Tuesday confirmed the reorganisation of the capital of the Astra Enamelling Co., Ltd., under Section 45 of the Companies Consolidation Act.

ANGLO-EGYPTIAN OILFIELDS.—The report for 1918 states that the total production of crude oil amounted to 277,300 tons, as compared with 134,500 tons in 1917. Towards the end of 1918 it was found that the profits resulting from the increased output of the fields warranted the payment of the arrears of interest on the income bonds which form a first charge upon the profits. The total interest accrued to November 1, 1918, amounted to £76,352, and this was paid. In April this year the position had improved to such an extent that the directors decided to pay off the arrears of the 6 per cent. dividend on the preference shares, amounting to £56,229; and to distribute an interim dividend on the whole of the ordinary shares—the amount on the P shares being at the rate of 15 per cent. per annum, and the others in their due proportion. The profits for the year amounted to £654,415. The directors recommend that final dividends be paid on the respective classes of shares. Upon the B shares this amounts to a further dividend at the rate of 10 per cent. per annum, making a total of 25 per cent. for 1918 upon the ordinary B shares.

BRITISH CYANIDES.—At the annual meeting, the chairman (Mr. C. F. Rowsell), announced that the balance of profit for the year was £20,572, against £20,572 in the previous year. A total dividend of 10 per cent for the year was declared.

BRUNNER, MOND, AND VAN DEN BERGHS.—Messrs. Brunner, Mond & Co. contradict the rumour that they contemplate the purchase of Messrs. Van den Berghs, Ltd., margarine and soap manufacturers, &c.

CENTRAL TRAVANCORE RUBBER COMPANY.—At the annual meeting in Edinburgh, on Wednesday June 25th, the chairman announced that the Company had sold forward a substantial part of their expected rubber crop for the next twelve months. It is proposed to issue an additional 4,000 shares, which will be offered to the shareholders *pro rata*.

CONSOLIDATED DUTCH OIL.—At a general meeting of the Consolidated Dutch Oil Co., held on June 28th, it was decided not to pay any dividend over 1918. Replying to a question as to whether the rumours were true about the awarding of bonus share or conversion of Consolidated shares in Royal Dutch shares, the chairman said that the rumours were unfounded.

CONSOLIDATED RUBBER AND BALATA ESTATES.—For the year to December 31st last the net profit amounted to £17,920, and £1,721 was brought in, making £19,641. The directors recommend a dividend, at the rate of 7 per cent. per annum on Preference, less tax, for the year, and payment, less tax, of interest at the rate of 4 per cent. per annum to holders of dividend funding warrant certificates; £1,000 is written off preliminary expenses, and £913 carried forward (subject to excess profits duty in British Guiana). Meeting, Winchester House, July 3rd, noon.

DISTILLERS CO.—For the year to May 15 last, after providing for depreciation of works, and in the value of the investments, and for liability under the Finance Acts, and payment of debenture interest, the profit balance for the year is £335,122, and £65,358 was brought in, making £400,480. To reserve, £100,000 (making it £300,000) to fire insurance fund, £5,000; to superannuation and provident fund, £20,000; further dividend of 6 per cent on Ordinary, free of tax, payable August 1, making 10 per cent. for year; forward, £70,435. The directors have made a donation of £1,000 towards a movement for the formation of a Chair of Commerce in the University of Edinburgh. Meeting, 8, 10 and 12, Torphichen Street, Edinburgh, July 18th at 1.

FORTUNA NITRATE.—The net profit for year to December 31st last, was £36,406, and £3,888 was brought in, making £40,294. A dividend of 7½ per cent., less tax at 5s. 9d. in the £; forward £32,065. The directors consider it prudent to carry forward this balance, in view of the abnormal conditions ruling in the nitrate industry at the present time. The net production of nitrate at the Company's oficinas during the year was 1,207,788 quintals. The profit has been taken on 1,165,613

quintals, and the unsold stock of 42,175 quintals on hand at December 31st, 1918, has been valued at approximate cost. Meeting, Winchester House, July 7th, noon.

HAVANA OIL COMPANY.—A resolution sanctioning the increase of the capital to £200,000 by the creation of 1,200,000 new shares of 2s. each, ranking *pari passu* with the existing shares, was adopted at an extraordinary general meeting the other day.

IPOH TIN DREDGING.—During the year to December 31st last, the dredge treated 634,820 cubic yards, yielding 246 tons of tin ore, equal to 0.82 lb. per yard. The hours run were 7,683, out of a possible 8,760, equivalent to 87.71 per cent., and the running costs amounted to 6.18d. per cubic yard. The profit for the year, after reserving £8,000 for taxation, amounted to £14,916. Dividends amounting to 10 per cent. for year have been paid, and £5,956 is carried forward. Meeting, Winchester House, July 15, noon.

JOHORE RUBBER LANDS (1913).—The net profit for year to December 31st last, amounted to £7,277, and £11,689 was brought in, making £18,966. The directors recommend apportioning to depreciation of buildings, &c., £3,717 to depreciation of machinery and plant £1,620, and carry forward £13,629. Crop, 1,153,925 lbs., against restricted estimate 1,150,000 lbs. Average gross price realised in London, is. 10.978d., against 2s. 4.93d. per lb. in 1917; gross price for sales in the East, 60.48 cents, against 81 cents in 1917. Cost f.o.b., is. 3.906d., against is. 3.243d.; and total cost, is. 4.990d. against is. 4.943d. Estimate for 1919, 1,824,000 lbs. Meeting, 38, Eastcheap, July 4th, at 2.

KIMANIS RUBBER (LIMITED).—The profits of the Kimanis Rubber (Limited) for 1918 amounted to £2,804, against £12,093, to which has to be added the balance brought forward, £8,585, making £11,389, which the directors propose to carry forward, subject to commission to manager and staff.

LOBITOS OIL FIELDS.—Dividend for 1918 of 15 per cent., less tax, against 5 per cent.: £30,000, against £10,000, is placed to reserve; and 36,546 is carried forward (subject to excess profits duty, if any), against £34,708. Warrants will be posted on Aug. 29.

MILLOM AND ASKAM IRON COMPANY: A RECONSTRUCTION PLAN.—The directors of the Milloom and Askam Hematite Iron Company recommend that a new company bearing the same name be formed with a capital of £2,000,000, of which £500,000 will be 7 per cent. cumulative and participating shares, and £1,500,000 ordinary shares. There will also be £1,500,000 debentures. The Preference shares will be entitled to additional dividends of 2 per cent. annually when the Ordinary dividend amounts to 10 per cent. It is proposed to distribute £1 of new Debenture Stock for each existing £100 Debenture. The present Preference shares will receive one cumulative participating Preference and the Ordinary holders five new shares for every share now held. The present share capital is £300,000, divided into equal portions of 7 per cent. cumulative Preference and Ordinary shares. There are also outstanding £132,000 5 per cent. Debentures.

NARAGUTA EXTENDED TIN.—The seventh ordinary general meeting of Naraguta Extended (Nigeria) Tin Mines, Ltd., was held on Friday, June 27th, at Winchester House, Old Broad-street, E.C., Mr. Segar R. Bastard (chairman of the company), presiding. The chairman said, that during the year under review, the Company recovered only a small amount of tin. That was due mainly to the falling off in tributing, to their taking the whole of the ground which had been partially worked before, and some of which might be barren, and to the fact that a considerable amount of sickness intervened in Nigeria in the shape of influenza during the year under review. The profit was £16,000 net, as against £25,000. This was partially due, to the falling off in the amount of tin won, and it was also due to the much higher amount that they had to pay for it as compared with what they had to pay in the previous year. They might congratulate themselves upon the fact that Naraguta Extended had been very cheaply worked. He had been talking to Mr. Smith, their manager, who was of the opinion that the mine would be working as long as any property on the Plateau, whatever the circumstances might be, simply on account of its situation and the water power available. The output this year was exactly 10 tons less than it was for the corresponding period last year. That in itself would be nothing, for they now had three pipelines installed, and there should be no difficulty whatsoever in making up the estimated amount which showed a considerable increase over what was won last year. The chairman concluded by moving the adoption of the report and accounts. Mr. H. V. Smith (the manager), in the course of a survey of the operations of the Company, said, that at their present rate of working they had at least fifteen years life ahead of them in profitable ground. He could not, of course, speak definitely as to the values contained in that area, but, judging by results obtained by neighbouring companies, he thought they might be satisfied that it would produce good results. Sir George C. Denton, K.C.M.G., seconded the resolution, which was carried unanimously.

NEW TRANSVAAL CHEMICAL.—Interim dividends for half-year to December 31st last of 3 per cent. less tax, on cumulative first pref. and of 4 per cent. less tax on cumulative "A" pref.

ROYAL DUTCH PETROLEUM.—Messrs. N. M. Rothschild & Sons are prepared to receive the provisional receipts of the 1916 issue to be exchanged for the definite share or sub-share certificates, which will be issued with Coupon No. 43 and following. The receipts, which must be listed in duplicate and left three days for examination, will be received daily (Saturdays excepted), between 11 and 2. Forms for listing the receipts can be obtained on application.

SANTA RITA NITRATE.—The gross trading profits, including interest, for the year to December 31st last, amounted to £12,881; less London charges and income tax, £3,911; net profit, £8,970, and £1,231 was brought in, making £10,201. Dividend of 5 per cent., 1 ss tax; forward, £5,201. The oficina was closed at the end of the year, and manufacturing operations will not be resumed until the large coast stocks have been materially reduced. The extraction of raw material is being continued. Meeting, Baltic House, 27, Leadenhall-street, July 10, at 12.30.

SECAMAT (JOHORE) RUBBER ESTATES.—For the year to December 31st last, the accounts show a debit balance of £1,793, subject to recovery of excess profits duty paid in respect of past accounting periods. The amount brought in was £16,708, from which has to be deducted excess profits duty paid for 1917, £6,200, debit balance for 1918 £1,793, leaving £8,715 now to be dealt with. The directors place £1,057 to depreciation, £3,150 to debenture stock redemption reserve, and carry forward £4,508. Crop, 422,105 lbs., against restricted estimate 450,000 lbs. Average gross price realised for shipments to London is. 10.253d. per pound, against 2s. 7.386d. per pound in 1917, and for sales in Singapore 59.48c., against 91½c. in 1917. Cost f.o.b. is. 3.193d., against is. 2.168, and total cost is. 4.346d. per pound, against is. 3.936d., Estimate for 1919, 604,000 lbs. During the year a further £2,040 of debentures were redeemed by purchase, making the total so redeemed £6,340. Meeting, 38 Eastcheap, July 4th, at 3.

SUNGEI KRIAN RUBBER ESTATES.—The profits for 1918 were £14,281, against £34,134. First and final dividend of 10 per cent. is recommended on the Ordinary shares, and a final dividend of 4 per cent. on the Cumulative Preference shares. The directors have also resolved to pay the six months' interest to June 30th, 1919, on the 6 per cent. Cumulative Preference shares.

SULPHIDE CORPORATION.—In view of the uncertainty of the metal position and of the fact that owing to the maritime strike in Australia, work at the Central Mine has been suspended since May 7th, and that the time for the resumption of operations is uncertain, the directors have decided to declare only an interim dividend of 5 per cent. on Preference in respect of year to June 30th next, payable July 25th.

STRATHMORE RUBBER CO.—The twelfth general meeting of the Strathmore Rubber Co. was held in Edinburgh last week. The chairman described the prospects for this year as good, the estimated crop for Buloh estate being 270,000 lbs. and for Strathmore 195,000 lbs., averaging 369 lbs. and 376 lbs. per acre respectively. Regarding the prospects of the rubber industry as a whole, the chairman said they were not at present very bright, but prosperity would be assured when the new consumption caught up production.

TRINIDAD CENTRAL OILFIELDS.—The report for 1918 shows net profits after writing off £12,637 for depreciation, etc., but before charging income-tax, are £11,950, against £6,000 for the fourteen months to December 31st, 1917; after reserving £5,168 in respect of income-tax there remains £9,808, which it is proposed to carry forward.

TREDEGAR IRON AND COAL.—The report for year to March 31st states that the Government has continued to control the industry throughout the period. The directors view with misgiving the disturbing effects of the Coal Commission Inquiry upon the coal trade generally, and they particularly deplore the suspension of development work throughout the country, followed by the loss of output naturally occasioned thereby. The profit for the past year, after making provision for excess profits duty and coal mines excess payments, was £250,356, and £14,900 was brought in, making £265,256. To depreciation, £10,000; to reserve, £40,000; written off suspense account—Army service dependents, £4,914, and pension commutations, £11,866; dividend of 10 per cent. free of tax, on "A" and "B" shares, of which 5 per cent. was paid in December last, and a bonus of 5 per cent. forward, £13,001. Meeting, 60 Fenchurch-street, July 7, at 3.

UROZ OILFIELDS, LTD.—The Uroz Oilfields, Ltd., which has come into some prominence owing to the introduction of its shares on 'Change has for its chairman, Mr. H. Walter Sillem, the managing director of the Lobitos Oilfields, Ltd., while Mr. Ernest Law (Metropolitan District Railway) and Mr. William R. Lester (chairman of the Kinneil Cannel and Coking Co., Ltd.) are its directors. Its capital is £300,000, and its properties are in the south of France, within 40 kilos of Marseilles, consisting of over 5,600 acres of anthracite coal and shale oil bearing lands.

ZINC CORPORATION, LTD.—At the annual meeting a dividend of 1s. 6d. per share, less income tax, on both preference and ordinary shares of the company's capital be, and is hereby, declared payable on Oct. 1, 1919, being a final dividend out of the surplus profits of the company in respect of the year ended December 31, 1918.

Stocks and Shares

Commercial, Industrial, &c.

Quotations

	July 2	June 25.
Alby United Carbide Factories, Lim., Ord.	1-1½	¾-1
Associated Portland Cement Manufrs. (1900.)		
Lim., Ord.	7½-8 ½	7½-7 ½
Bell's United Asbestos Co., Lim., Ord.	2½-2½	2½-2½
Bleachers' Association, Lim., Ord.	1½-1½	1½-1½
Borax Consolidated, Lim., Prefd. Ord.	4½-4½	4½-4½
Bradford Dyers' Assoc. Lim., Ord.	2½-2½	2½-2½
British Aluminium Co., Lim., Ord.	1½-1½	1½-1½
British Oil and Cake Mills, Lim., Ord.	1½-2	1½-2
British Portland Cement Manufrs., Lim., Ord.	34/0-36/0	34/0-36/0
Brunner, Mond & Co., Lim., Ord.	1½-2	1½-2
Castner-Kellner Alkali Co., Lim.	2½-2½	2½-2½
China Clay Corporation, Lim., Ord.	4-4	4-4
Cook (Edward) & Co., Lim., 4% 1st Mort.		
Deb. Stock Red.	57-61	57-61
Courtaulds, Lim.	10½-10½	10½-11 ½
Crosfield (Joseph) & Sons, Lim., Cum. 6% Prefce.		
Curtis & Harvey, Lim.	¾-1½	¾-1½
Explosives Trades, Lim., Ord.	20/6-21/6	22/0-23/0
Field (J. C. & J.), Lim., Ord.	7-9	7-9
Greenwich Inlaid Linoleum (Fredk Walton's New Patents) Co., Lim., Ord.	½-5	½-5
Harrison & Crosfield, Lim., 10% Cum. Prefd. Ord.	1½-1½	1½-1½
India Rubber, Gutta Percha and Tel. Wks. Co., Lim., Ord.	17½-17½	17½-18
Lawes' Chemical Manure Co., Lim., Ord.	6-6½	6-6½
Lever Bros., Lim., 6% Cum. "A" Prefce.	19/3-19/9	20/1½-20/7½
Do. 6½% Cum. "B" Prefce.	21/9-21/3	21/0-21/6
Magadi Soda Co., Lim., Ord.	1½-1½	1½-1½
Manganese Bronze and Brass Co., Lim., Ord.	¾-7	¾-7
Maypole Dairy Co., Lim., Defd. Ord.	1½-1½	1½-1½
Mond Nickel Co., Lim., 7% Cum. Pref.	1½-1½	1½-1½
Do. 7% Non. Cum. Pref.	1½-1½	1½-1½
Pacific Phosphate Co., Lim., Ord.	5-5½	4½-5½
Power-Gas Corporation, Lim., Ord.	¾-¾	¾-¾
Price's Patent Candle Co., Lim.	3½-4	39-41
Salt Union, Lim., Ord.	1½-1½	1½-1½
United Alkali Co., Lim., Ord.	1½-1½	1½-1½
Val de Travers Asphalt Paving Co., Lim.	1½-1½	1½-1½
Van den Berghs, Lim., Ord.	3½-3½	3½-3½
Walkers, Parker & Co., Lim.	1½-1½	1½-1½
Welsbach Light Co., Lim.	2½-3	2½-3

Gas, Iron, Coal and Steel.

Gas Light and Coke Co., Ordinary Stock (4% Stand.)	57-59	57-59
South Metropolitan Gas Co., Ordinary (4% Stand.)	59-61	60-62
Ebbw Vale Steel, Iron & Coal Co., Lim., Ord.	28/6-29/6	29/0-0/0
Hadfield's, Limited, Ordinary	2½-2½	2½-2½
Staveley Coal & Iron Co., Lim., Ord.	1½-1½	1½-1½
Vickers, Limited, Ordinary	36/6-37/6	36/6-37/6
Armstrong (Sir W. G.) Whitworth, Ltd., Ord.	36/3-37/3

Mines, Nitrate, &c.

Rio Tinto Co., Lim., Ord. (Bearer)	58-60	58-60
Antofagasta Nitrate Co. Compañia de Salitres de Antofagasta) 5½% 1st Mt. Debs. Red.	91-96	91-96
Lagunas Nitrate Co., Lim.	1½-1½	1½-1½
Tarapacá and Tocopilla Nitrate Co., Lim.	15/0-17/0	16/0-17/0
Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.	14½-15½

Oil and Rubber.

Anglo-Persian Oil Co., Lim., Cum. 6% Part.	1½-1½	1½-1½
Mexican Eagle Oil Co., Lim. (Cia Mexicana de Pet. "El Aguila" S.A.) 8% Pref. (Bearer Non. Cum.)	7½-8	7½-7½
"Shell" Transport and Trading Co., Lim., Ord.	10 ½-10 ½	9½-9½
Do. 5% Cum. Pref.	9-9½	9-9½
Anglo-Java Rubber & Produce Co., Lim.	6/3-6/9	6/10½-7/4½
Anglo-Malay Rubber Co., Lim.	13/1½-13/7½	13/1½-13/7½
Chersonese (F.M.S.) Estates, Lim.	3/9-4/0	3/10½-4/1½
Linggi Plantations, Lim., Ord.
Anglo-Maikop Corporation, Ltd., Ord.	6/9-7/9
Burmah Oil Co., Ltd., Ord.	11½-11½

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

LONDON GAZETTE

Liquidators' Notices

THE KIRK CHEMICAL CO., LTD.—Creditors' claims on or before July 25, to Robert Miller, C.A., 42, Spring Gardens, Manchester, liquidator.

BODE RUBBER ESTATES, LTD.—A general meeting of members of the Bode Rubber Estates, Ltd., will be held at 20, Copthall Avenue, London, on September 8, at 12 noon. I. R. Phillip, liquidator.

THE WOHLER MINERAL OIL PRODUCTS (1910), LTD.—Meeting of creditors at 17, Fenchurch Street, E.C., Wednesday, July 9, at 12 noon. Edwin Hard, liquidator.

Partnerships Dissolved

LUKE (Anthony John) and **BAILEY** (John Gregory), chemical merchants, 1-4, Great Tower Street, London, E.C. 3, under the style of Luke and Bailey, by mutual consent, as from June 24. All debts received or paid by Black, Geoghegan & Till, 21, Bucklersbury, E.C. 4.

MARTIN (Sidney) and **LANNING** (George), oil and colour merchants, Westgate Buildings, Bath, under the style of Martin and Lanning, by mutual consent as and from June 25. All debts received and paid by Sidney Martin.

Notice of Dividend

THE SUNGEI MUDA RUBBER SYNDICATE, LTD., London House, Crutched Friars, London.—20s., first and final. Any day (except Saturday) between 11 and 2, at the Offices of the Official Receiver and Liquidator, 33, Carey Street, Lincoln's Inn, London, W.C. 2.

Company Matters

AUSTRALIAN COKING AND BY-PRODUCTS CO., LTD. and Reduced.—A petition was presented on June 19, to His Majesty's High Court of Justice for the confirmation of the reduction of the capital of the above-named Company from £200,000 to £139,995 and the petition is directed to be heard before Mr. Justice P. O. Lawrence, on Tuesday, July 8.

SOCONUSCO RUBBER PLANTATIONS, LTD.—At an extraordinary general meeting of the members of the above Company, held at the Chamber of Commerce, Oxford Court, Cannon Street, London, on May 29, the following special resolutions were passed; and at a subsequent extraordinary general meeting of the members held at Ceylon House, 49-51, Eastcheap, London, on June 16, the following special resolutions were confirmed, viz.:—

"(1) Resolved that the Reconstruction Scheme set out in the Memorandum printed herewith, submitted to the Lords Commissioners of His Majesty's Treasury, who have granted their licence and now submitted to this meeting, be and the same is hereby approved.

"(2) Resolved that Soconusco Rubber Plantations, Ltd., be wound up voluntarily; and that Mr. Ashmore Russian and Mr. Charles Alfred Sack, both of Ceylon House, 49-51, Eastcheap, London, E.C., be, and they are, hereby appointed joint liquidators of the company, for the purposes of such winding-up, at a joint fee of two hundred guineas.

"(3) Resolved that the said liquidators be, and they are, hereby authorized to assent to the registration of a new Company, to be called the Mexican Rubber Co., Ltd., or by some similar name, with a memorandum and articles of association which have already been prepared with the privacy and approval of the Directors of this Company.

"(4) Resolved that the said liquidators be, and they are, hereby authorized, pursuant to section 192 of the Companies (Consolidation) Act, 1908, to enter into an agreement with such new company (when incorporated) for the sale to it of the undertaking and assets of this company, subject to its liabilities, in consideration of shares in such new company, in the terms of the draft agreement, which has already been prepared and submitted to this meeting, and is hereby approved, and to carry such agreement into effect with such (if any) modifications as they may think expedient."

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C. 1:—

J. SWIRE & SONS, LTD., chemists, druggists, &c. Nominal capital, £5,000 in 5,000 shares of £1 each. Directors to be appointed. Qualification of Directors, £100. Remuneration of Directors

to be voted by Company in general meeting. Subscribers: J. Swire, 88, King's Cross Road, Halifax; C. H. Swire, 152, Queen's Road, Halifax; P. W. Swire, 430, Burnley Road, Halifax.

EUCRYL, LTD., 138, Borough High Street, S.E., Wholesale manufacturing chemists. Nominal capital £100,000 in 37,500 par. preference ordinary shares and 37,500 deferred ordinary shares of £1 each. Minimum subscription, 7 shares. Directors: L. Major, 12, Norfolk Street, Strand, W.C.; J. T. Pilling, The Court, Wolverley, Worcester. Qualification of Directors, £250. Remuneration of Directors to be voted by company in general meeting.

GEORGE HOLLIDAY & CO., LTD., 325, City Road, Manchester. Chemists, &c. Nominal capital £1,000 in 1,000 shares of £1 each. Directors: E. G. Nichols, Bedford House, The Peaches, West Didsbury; F. H. Sprott, 67, Cavendish Road, ChorltoncumHardy; A. K. Miller, 4, Darley Avenue, West Didsbury; W. Kirby, 39, Victoria Road, Pendleton; R. H. Adams, Sefton Villa, Barlow Moor Road, Didsbury. Remuneration of Directors to be voted by company in general meeting.

TUNGSTEN MANUFACTURING CO., LTD., Thanet House, Strand, W.C., manufacturers of tungsten and other metals. Nominal capital £150,000 in 150,000 £1 shares. Directors: To be appointed by subscribers. Qualification of Directors, £100. Remuneration of Directors, £150 each; chairman, £200.

WHITEHALL PETROLEUM CORPORATION, LTD. To acquire, prospect, and work oil fields and oil and gas bearing properties of all kinds, coal, gold and other mines. Nominal capital £1,000,000 in 1,000,000 shares of £1 each. Directors: To be appointed by subscribers. Qualification of Directors, £1,000. Remuneration of Directors to be voted by company in general meeting. Subscribers: Murray of Elibank, 47, Parliament Street, S.W.; J. Lister Walsh, 47, Parliament Street, S.W.

LANDORE ZINC WORKS, LTD., oxide manufacturers. Nominal capital £100,000 in 100,000 shares of £1 each. Directors: J. R. Down, 57 and 58, Wind Street, Swansea; A. S. Young, Hill House, Park Hill, Carshalton, Surrey. Qualification of Directors, £500. Remuneration of Directors to be voted by company in general meeting.

JOHN FORSTER & CO., LTD., paint merchants, &c. Nominal capital £25,000 in 25,000 shares of £1 each. Directors: T. J. B. Yule, 3, Belford Road, Sunderland (Gov. Dir.); Major Kirkup, 7, Thornhill Terrace, Sunderland. Qualification of Directors: £5,000 Governing Director; others £100. Remuneration of Directors to be voted by company in general meeting.

STANDARD OIL & REFINING CO., LTD. Nominal capital £300,000 in 300,000 shares of £1 each. Directors to be appointed by subscribers. Qualification of Directors £1 share. Remuneration of Directors to be voted by company in general meeting. Subscribers: F. H. Stevens, 17, Alexandra Mansions, West End Lane, N.W. 6; A. Tunks, 54, Brairwood Road, Clapham Park, S.W. 4.

SHEET METAL & GALVANISING CO., LTD., 2A, Tyrell Street, Bradford. Nominal capital £10,000 in 3,000 preference shares of £1, and 7,000 ordinary shares of £1. Directors: C. Tempest, 176, Hollingwood Lane, Bradford; F. Ball, 260 Cemetery Road, Bradford. Qualification of Directors 200 shares. Remuneration of directors to be voted by company in general meeting.

LOWE, CLAYTON & HICKS, LTD., 18, Straford Road, Acton, W. 3., colour manufacturers. Nominal capital £5,000 in 5,000 shares of £1 each. Minimum subscription, 1 share. Directors: J. Seed, 59, West End Lane, West Hampstead, N.W. 6; J. J. R. Potter, 47, Shoot-up Hill, Cricklewood, N.W. 2; J. I. Ash, 105, Broadhurst Gardens, West Hampstead, N.W. 6. Qualification of Directors, 1 ordinary share. Remuneration of Directors to be voted by company in general meeting.

Oil in Derbyshire

Oil was struck at Ironville, Derbyshire, last week in a gratifying quantity. This was the one well which had not given any satisfactory indication of the likelihood of oil being found, and the borers were contemplating abandoning further operations. The well is in a direct geological line with the wells at Brimington and Hardstoft, where oil is still steadily flowing at the rate of some 400 gallons a day. The Ironville well is not far from Riding's Pit, where an oil spring was discovered in 1849 at a depth of about 1,400 ft. This oil for 18 months produced 300 gallons a week and then gradually failed. There has been a break in the casing at Brimington well, but this has been repaired and the boring resumed. Indications, both at Brimington and Renishaw, are favourable, and oil may be reached any moment.

"Rubber and Oil"**Robert Beall Boyle at the Old Bailey**

ROBERT BEALL BOYLE, the central figure in the "Rubber and Oil" trial, which occupied the attention of a judge and jury for several days at the Central Criminal Court in February, 1914, on Monday again made his appearance at the court, before the Recorder (Sir Forrest Fulton, K.C.). It will be remembered that Boyle was convicted and sentenced. All the charges against him were not inquired into in 1914, and at the trial the judge directed that they should be allowed to remain on the file. Boyle now applied that those remaining charges should be disposed of.

At the direction of the Recorder, Boyle entered the dock, and was charged with unlawfully threatening Richard Wheeldon Barnett, and other persons, on November 27, 1913, to print and publish divers libellous matters concerning them. He was also charged with conspiring with other persons to print and publish divers matters concerning the British Oil Investment Co., Ltd., the Motor Owners Petrol Combine, Ltd. In addition there was a charge of demanding money from Walter Norman Morrison and the Rubber Exploration Co., Ltd., with the intention of stealing such money. To all the charges the defendant pleaded not guilty.

The Recorder: Nobody appears to support this indictment. The Director of Public Prosecutions has been communicated with and he says that he has no part in the matter at all. I understand that the nominal prosecutors have been communicated with, and informed of the fixing of the case.

The Clerk of the Court: No communication whatever has been received from them.

Addressing the jury, the Recorder said that the case was one in which the defendant was tried at that court in 1914 upon certain charges to which it was not necessary to refer more particularly. He was convicted by the jury and sentenced, and he endured that sentence. In addition to the charges which were dealt with in 1914 there were other charges which were directed to remain on the file of the court. The defendant said that the fact of those indictments being on the file of the court was being made use of by persons who were evilly disposed towards him. The accused had the right to be tried on those charges. He pleaded not guilty to the charges, and as the persons interested in the matter, including the Public Prosecutor, did not appear in support of the charges, the jury would say that the defendant was not guilty.

The jury, under the direction of the Recorder, returned a formal verdict of not guilty, and the defendant was accordingly discharged.

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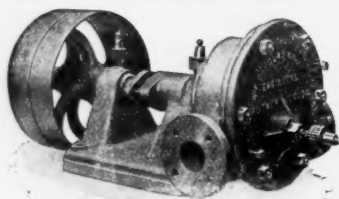
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